Food Manufacture

Incorporating Canning, Packing, and Preserving

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Canned Cherries.

THE EMPIRE Marketing Board's report of weekly arrivals for May 5, 1932, shows the entry of 280 cases of cherries from France and 120 cases from Italy for the week ending April 30. During the period April 30, 1932, to July 2, 1932, imports from Italy amounted to 4,925 cases.

Commenting on this, an American report states that examination of a can packed in Italy revealed that nearly every cherry bore marks resembling worm holes, but no worms could be found. "For quality, American cherries surpass the Italians, and there is a possibility that a special pack of American fruit to compete with the Italian might be worth while."

Not long ago there was a rather stupid tale going round that quite decent cherries were grown in Kent! We are not, of course, suggesting that Kent should "play gooseberry" in this affair between Hiram and Donna Italiana.

Salting Herring.

Neal Carter has recently presented to the Biological Board of Canada a preliminary report on the salting of herring. It is interesting to learn that the B.C. herring salting industry supplies a large proportion of the Orient's requirements. We knew, of course, that—

> In the river of Fraser,
> A very long way, sir,
> They catch lots of salmon, I trow.
> But though they can't eat
> All the salmon they can,
> They can eat the salmon they can't.

But we had not hitherto fully appreciated the importance of B.C.'s herring industry.

Carter's report sets out the causes of spoilage and the function and mechanism of salting (combined osmosis and diffusion) very clearly. The salting of round herring presents two difficulties not encountered with cleaned and split fish—viz.: (1) Because of the retention of the viscera and blood the fish must be very fresh and the salting must be done as rapidly and completely as possible in order to check the action of the enzymes which are comparatively abundant in the viscera and blood. (2) The whole fish does not give the brine access to the inner flesh as readily as when the fish is split open.

The rapid loss of water through osmosis is partially balanced by the slow inward diffusion of the brine, resulting in a sudden decrease in weight during the first thirty-six hours, followed by a gradual increase. The weaker brines required three weeks for complete diffusion, whereas no further change took place after eleven days in the case of the saturated pickle. The final salt contents of the fish were much the same in both cases.

English Asparagus.

In a report issued abroad we read that there is only a negligible quantity of asparagus grown in Great Britain and that there does not seem to be much encouragement in increasing the acreage, although supplies which were previously imported from France have been largely curtailed since the establishment of a tariff. Apparently the Worcester district is the principal producing area. Heavy manuring and intensive hand cultivation produce asparagus of high quality which, although quite acceptable to the markets, cannot be produced by hand cultivation on these heavier types of soil at a cost low enough to enable factories to compete with imported canned asparagus.

A member of the produce trade, the report continues, was very frank in stating that he did not believe that the canning of English green asparagus

would be a practical venture, due to the limited supplies as well as the comparatively greater cost of production over Californian varieties.

B.C. Berries.

From Vancouver, Canada, it is reported that efforts are being made to finance an export organisation to handle berries and small fruits processed in sulphur dioxide, taking advantage of preferential tariffs for export to Great Britain. It is estimated that producers will be able to supply 560 to 1,120 short tons of these fruits for the market in the U.K.

South African Success.

It is understood that a Durban packer, in face of severe competition from South Africa and Australia, has been able to secure a contract to supply the Italian army with a certain proportion of its meat requirements. This contract, which was held for several years previously by another South African concern, is said to provide for 10,000 tons of meat, and represents the consumption of something like 50,000 head of cattle.

Whether the contract will be profitable remains to be seen, but it is granted by most authorities that no Union firm would have had a chance of participating were it not for the 35 per cent. subsidy which the Government is granting on all exported meat.

It is understood that the Rhodesian Stock Owners' Association, of Bulawayo, has decided to test the English market for small, regular shipments of frozen beef.

Fish Research.

Research is active in Canada. Mr. D. B. Finn has resumed the Directorship of the Pacific Fisheries Experimental Station, Prince Rupert, B.C., on his return from the Low Temperature Laboratories at Cambridge, where he was engaged on a study of freezing and its relation to physical and chemical changes in animal tissues. The work, which has a direct bearing on "drip" and the proper temperature of cold storage, is being applied to fish.

Professor R. A. Wardle, of the University of Manitoba, is continuing his fish parasite studies at the Pacific Biological Station, Nanaimo.

Dr. J. L. Hart has commenced a search for the eggs and larvæ of the pilchard off the west coast of Vancouver Island. He reports that the young fish now occurring in large schools in the sounds are yearling fish—that is, they are just entering upon their second year.

Then, again, the Prince Rupert Laboratories have been busy studying the vitamin content of liver oils from halibut, ling cod, salmon, and grey cod. These are good sources of vitamin A. Moreover, the station's investigations show that the liver oil of dogfish has a vitamin A content, and since it can be produced cheaply, it is useful for blending with oils of high vitamin D content.

Scottish Herring.

It is stated that negotiations for the sale to Russia of 100,000 barrels (about 35 million pounds) of Scottish cured herring have been completed. Scottish exports of cured herring in 1931, which amounted to about 170 million pounds, were less than half those in 1929.

Japanese Crab.

The Japan Tinned Crab Meat Guild reports that for the present season only seven vessels, with an aggregate tonnage of 18,412, are operating as floating canneries. This compares with eight vessels with a tonnage of 29,413 in 1931, and nineteen vessels with a tonnage of 63,924 in 1930.

This season's output by floating canneries is estimated at 180,000 cases, while production last year totalled 240,339 cases. This latter figure does not agree exactly with information secured previously, and probably includes only crab actually inspected and passed by the Guild.

Synthetic Ham.

Chemical science has succeeded in producing artificial imitations of many food products, though it must be confessed that we have not yet had the pleasure of making the acquaintance of "synthetic" ham. In this connection, however, a correspondent has raised a point which may be of practical value. He says that, some time ago, he had occasion to prepare benzene sulphonic chloride, an oil obtained by the action of phosphorus pentachloride on sodium benzene-sulphonate. He was much impressed by the "hammy" odour of this substance. He describes it as unpleasant, but suggests that in minute traces it might have an agreeable flavour.

The ham sandwich of the railway refreshment room has been the subject of innumerable jests, which we will refrain from repeating. That is one of the ways in which the railway companies secured publicity in the old days. We do not know if there was a special department for manufacturing these jokes, and we forgot to ask our correspondent whether he was ever on the staff of one of these joke manufacturing establishments, assuming they had an official existence. We were inclined to take a rather serious view of the last sandwich we had at Benzenham. At the time we suggested the chemical department had got mixed up somehow with the jocular department (if it ever existed). Our correspondent only increases this suspicion.

Beverage Exposition.

An "historical exhibit" will be an interesting feature of the International Beverage Exposition to be held at Cleveland, Ohio, from November 14 to 18, in conjunction with the annual convention of the American Bottlers of Carbonated Beverages. While there is some disagreement among historians as to who was the first person to carbonate water artificially, the distinction is usually accorded to Joseph Priestley. There is no doubt that Priestley, who emigrated to America in 1804, gave the inspiration to Speckman that resulted in the founding of the carbonated beverage industry in America in 1807. To-day there are approximately 8,000 manufacturers of carbonated beverages in that country.

Great Britain is expected to be represented at the Exposition by a substantial delegation.

The National Union of Mineral Water Manufacturers' Associations of Great Britain recently appointed its president, J. W. Kerr, of Birmingham, a delegate to Cleveland, and several of the local associations in Great Britain are scheduled to hold meetings to take similar action in the near future. In addition, many British bottlers will make the trip with these delegates as part of a tour of the United States and Canada being arranged by the American Express Company.

Honey Spoilage.

It was pointed out by H. F. Wilson at the August meeting of the American Chemical Society that spoilage of honey held in storage over long periods of time is a serious problem in the American honey industry. It is due to two main factors: (1) Attack by sugar tolerant yeasts, and (2) decomposition of the sugars when honey is held at temperatures of about 80° F. or above for any length of time.

It appears that honey rarely escapes contamination by inoculation with these yeasts. The optimum temperature for fermentation is about 60° F., but none of the known honey yeasts will grow at a temperature below 52° F.

Although ripe honey will not be subject to fermentation when stored at 80° F., yet chemical changes (partly oxidative) eventually set in and affect both colour and flavour. It is suggested that some gluconic acid is formed; its presence produces a flat or caramel flavour which becomes stronger as chemical decomposition proceeds.

Caking Inhibitors.

At the same meeting Moss, Schilb, and Warning presented an interesting paper on tri-calcium phosphate as a caking inhibitor in salt and sugar. They described a method for comparing the anti-caking properties of fillers in these products. The efficiency of tri-calcium phosphate as a caking inhibitor is found to be dependent upon four major variables. These are particle size, $CaO : P_2O_5$ ratio, ignition loss, and $(Fe-Al)PO_4$ content. The authors state that the addition of tri-calcium phosphate to salt and sugar favourably affects their physical characteristics.

The Sun God.

All through recorded history there are many instances of beliefs coming to the surface again and again, each time in a different guise so as to be almost unrecognisable and something entirely "new." It is a common saying, however, that actually there is nothing new under the sun.

At first sight one would hardly expect to find that the vitamin vogue had its precursors, and yet the intimate connection between solar energy and the production of vitamins was realised—unconsciously, of course—3,290 years ago by Aknaton, an unorthodox Pharaoh of his time, who insisted that the polytheism of his day was wrong and that there was only one God, the Sun, the source of all goodness and life. Everything, in his opinion, arose from it, and no doubt there are many sun and vitamin worshippers of to-day who would agree with him, differing only in being able to supplement Aknaton's "hunch" by a vast body of scientific data which would have greatly surprised and delighted the old gentleman had he been able to reappear on the scene to-day.

It is never safe to scoff at "hunches," beliefs, opinions, intuitions, and the like. In each there may be a germ of truth. Take another example.

Colour of Butter.

It is well known that, more especially in certain districts, the public show a preference for butter of a rich yellow colour and regard a pale-hued product with disfavour. In the past, no special significance has been attached to this preference, and the demand for relatively highly coloured butter has been met by the use of annatto and, in recent years, oil-soluble coal tar dyes.

It now appears that the preference has a sound biological basis, like so many of the instinctive tastes of human beings. There is a correlation between the natural colour of butter and its vitamin content. In the light of recent research, Steenbock's attempt to identify vitamin A with carotene is seen to be less wide of the mark than was formerly supposed. The two substances are not identical, but there seems to be no doubt that the animal organism is capable of producing vitamin A from carotene. The former appears to be an unsaturated alcohol derived from half the carotene molecule.

Artificial Colouring.

In his Cantor lectures, recently delivered before the Royal Society of Arts, Professor Drummond ex-

presses the opinion that, "in view of the very great importance of the natural colour of butter as an indicator of its vitamin value, it is imperative that steps should be taken in the near future to prohibit the artificial colouring of butter or butter substitutes with pigments other than carotene. The prohibition should also be extended to cover the misleading artificial coloration of the so-called 'custard powders' and 'egg substitutes' with yellow dyestuffs which is unfortunately permitted at present."

A Puzzle.

"When is a cake not a cake?" jestingly asks the *Daily Telegraph*, but, unlike Pilate, forthwith provides the answer: "When it wins a prize at an international show." This curious and somewhat anomalous answer was occasioned by the visit of the *Daily Telegraph's* special correspondent to the Confectioners', Bakers', and Allied Traders' Thirty-sixth International Exhibition held at the Agricultural Hall in the first week of September. At first sight this might be deemed an insult to the prize winners of the cake classes, but in reality it is a plea for the adoption of a less prosaic word to describe the towering miracles in marzipan and the marvellous groups of statuary executed in sugar, that were to be seen on the display benches in the "Decorated Cakes and Various" section at the show. Indeed, the usual conception of the word "cake" is quite insufficient to designate such creations of art as "The Parting of Ruth and Naomi"—a wonder in sugar.

Confectionery has advanced so far these days that its vocabulary should be extended. The "cake" that the widow made from the handful of meal and the drop of oil was a very different affair from some of the ornate sweetmeats that grace the festive board at a modern wedding or Christmas party. In the original conception of the word the major portion of the cake consisted of meal or flour, but in many of the decorated cakes to-day flour occupies a very minor part in the general make-up of the finished article. The modern "cake" can scarcely be considered as a foodstuff—it is a sweetmeat, something to attract the eye and please the palate, the liqueur of the tea-table—and this being so we must congratulate the makers of the beautiful and attractive exhibits placed on the benches at Islington for the delectation of our eyes, if not the indulgence of our palates.

Cottonseed Oil Foods.

In America the Institute of Cottonseed Oil Foods has been formed by leading refiners of cotton oil and manufacturers of cotton oil products to aid in increasing the use of cotton oil in foodstuffs. Among the founders, who attended the meeting at the Beverly Country Club, Chicago, during the week of July 29, were Procter and Gamble Co., Southern Cotton Oil Co., Swift and Co., Armour and Co., Wilson and Co., Cudahy Packing Co., and others.

Custard Powder.

What is custard powder? The average individual, after consulting his wife, mother, or Mrs. Beeton, would probably say, "A preparation made from eggs, milk, and cornflour," and if it were a cream custard one would expect to find a certain amount of cream in the recipe. The Salford Analyst has, however, been making discoveries which shake the above definitions to their very root. During the year he has examined twelve samples of commercial custard powder, and in three cases he has taken objection to the labels, which contained the words "Cream Custard Powder." Admittedly, in one case the label contained the words (in very small type) "Contains no eggs, milk, or cream." A cream custard powder containing not even milk and eggs, let alone cream! No wonder the city analyst was horrified.

He believes that had the Public Health Authorities exercised the vigilance fifty years ago that they do to-day, these powders would have been described as substitutes for custard. However, a trade custom has grown up, and the effect of this is that we are now compelled to accept these substances as "custard powder," even though they consist of 99 per cent. of cornflour and have no earthly connection with eggs, milk, or cream.

We agree that such designations as "Cream Custard Powder" are misleading if the powder contains no cream, but our language is very loose in general. We talk of milk of lime and milk of sulphur, but we don't expect these preparations to contain the milk of the cow, and scarcely anyone expects face cream or furniture cream to be made up from the cream from cows' milk. The point at issue is: Is the word "cream" used as meaning a viscous semi-fluid mass or the material which separates from milk? We agree with the sentiments of the Salford Analyst, but correct labelling of products to convey honest-to-God facts is a very difficult matter.

U.S. Oysters.

We are glad to hear that there is likely to be a good year for American oysters. There are plenty on the beds and now that control is exercised there should not be anything like the demoralisation of the market that there was last year.

Banana Shoes.

We are informed that a factory is shortly to be started in Jamaica to produce shoe soles, among other things, from banana waste. This waste, now burned, will be used to manufacture brown paper and a tough cardboard, which will form the basis of shoe soles and other articles.

PRODUCING VACUUM IN CANNED FOODS

By M. A. JOSLYN and E. M. MRAK

University of California, Berkeley

THE REDUCTION of the air inside a can to as low a figure as possible is essential:

(1) To reduce chemical changes in the food due to atmospheric oxygen.

(2) For the preservation of flavours and vitamins readily destroyed by oxidation upon standing or during processing.

(3) To minimise or prevent unnecessary mechanical strains in the can during processing.

(4) To reduce corrosion of the container.

(5) To keep the ends of the can collapsed so that its external appearance may serve as an indication of the condition of the product within.

(6) To restrict or prevent growth of aerobic organisms, such as certain bacteria and moulds.

The value of producing vacuum in foods preserved by heat sterilisation in hermetically closed containers was realised early, and exhausting is now considered an essential and necessary step in the cannery procedure. The value of vacuum in the preservation of the flavour of products such as coffee and nuts has only recently been appreciated and may spread to other similar products such as tea and spices.

According to the commonly accepted version of Appert's process, the "Father of Canning" introduced exhausting by heat as a step in the process. His process is said to have consisted in packing the food product into wide-mouthed glass bottles with water, corking *loosely*, placing in a water bath and heating at or near boiling-point for the required length of time, removing the bottles from the water bath, and finally sealing by driving the corks tightly into the bottles. However, according to the English translation by Mrs. K. G. Bitting of his work on "The Art of Preserving Foods," the bottles were specially constructed with a ridge extending into the interior of the opening below the cord line "so that" a cork driven up to three-quarters its length was constricted through the middle and thus presented an "obstacle to the expansion which is produced upon the substances enclosed in the bottle by the applica- of heat." Care was taken to cork the bottles *tightly* and to wire the corks into place *before* processing in a water bath. However, even if he may have introduced exhausting, it is certain that he did not realise its value, since he was more interested in excluding "external air" than of removing "heated" air inside the container.

The function of vacuum, and the effect of several factors such as time and temperature of exhaust, fill of can, exhaust with lightly clinched covers, delay between exhaust box and closing machine, tightness of seam, freshness of product, expansion rings, etc., on the vacuum produced has been studied in some detail by the National Canners' Association and the Bureau of Plant Industry, as well as the Fruit Products Laboratory and other interested institutions. Since their findings were reported in a number of publications, and summarised in several texts, it is not necessary to repeat them. Therefore, this paper will be limited to a discussion of the methods used to produce vacuum, the necessary equipment, and its development.

Vacuum in canned foods is generally produced commercially by exhausting by heat or by mechanical means. In many food products a vacuum is frequently obtained by filling the food into the can while hot, or by pouring hot syrup or brine over the food in the can. Additional exhausting by heat is not absolutely necessary for products like corn which are forecooked, for those that are kettle-cooked and filled hot, or for products such as peas and beans which receive a hot brine. However, it is generally considered essential to exhaust further by heat fruits and vegetables even though the former may receive a hot syrup and the latter a hot brine.

Exhausting by heat is the oldest and commonest method of obtaining vacuum in canned foods to be processed by heat. Before the advent of the sanitary can, the usual procedure was to solder the top of the can, punch a small hole in the lid for a vent, exhaust, and then seal the hole by a drop of solder. When the sanitary cans were adopted two methods of exhausting the cans were used. In one the filled cans were passed through the exhaust boxes open, and in the other the cans were passed from the filler to a machine in which the covers were loosely clinched before passing through the exhaust boxes.

The first practice was not altogether satisfactory, because of the condensation of steam in the boxes and consequent drip of water into the cans and the loss of small pieces of food in the passage through the box, resulting in unsanitary conditions of the

box. The loosely clinched covers in the second practice permit the escape of air and gases but prevent the entrance of water and solid matter; they apparently also aid in the retention of heat during passage from exhaust box to the closing machine, and this retention of heat results in a higher vacuum. In the salmon industry the second method is generally used where the vacuum is produced by heat.

However, the practice of lightly clinching the covers before exhausting is not universally used. In most canneries where fruit and vegetables are processed the older method is still in use, although the practice of clinching the covers is employed for "dry-pack" prunes in California. Before the development of separate clinching units, regular can closing machines were used for this purpose, the first roll only being applied and the can subsequently sealed in another closing machine. This unduly increased the length of the canning line. However, special clinching units have been developed which are available for this purpose.

Development of Exhaust Boxes

Prior to the introduction of mechanical exhaust boxes in the canning industry, cans were exhausted in hot water or wet steam in the following manner: Sealed cans having a venting hole in the top were partly submerged in the hot water or steam and much of the air in the cans was driven out through the venting hole. The cans were then removed and the venting hole closed by soldering, thus maintaining a partial vacuum in the can. This method was obviously slow, inefficient, and not entirely reliable.

Mechanical exhaust boxes came into existence at about the same time as the continuous closing of cans. With increased efficiency in sealing, a continuous and more reliable method of exhausting was desirable. Though the development of the sanitary can was started early in the twentieth century, its use did not become widespread until several years later.

The "Cable" Type.

One of the first exhaust boxes to be used commercially was the so-called "cable" exhaust box (see Fig. 1). In this box the cans were carried on cables backwards and forwards through wet steam. The speed of these exhaust boxes was about fifteen cans per minute for No. 10 cans and thirty cans per minute for No. 2½ and smaller cans. This is much slower than present-day speed, but in 1909 it was considered fast. The cable exhaust box came into wide use shortly after its introduction, but soon met with one very serious objection in fruit canneries. The water, syrup, and acid from the pieces of fruit that fell on the cables caused them to corrode and break or jam in peak seasons.

In fish and meat canneries, however, this box has met with a fair degree of success, because the oil drippings from these products tended to lubricate and protect the cables against corrosion and sticking. Though the cable box has been practically eliminated from all the large fruit canneries in California, a number of them may still be found in fish canneries. A particular feature of this early type of exhaust box was the sectional type of water-seal arrangement for the top cover.

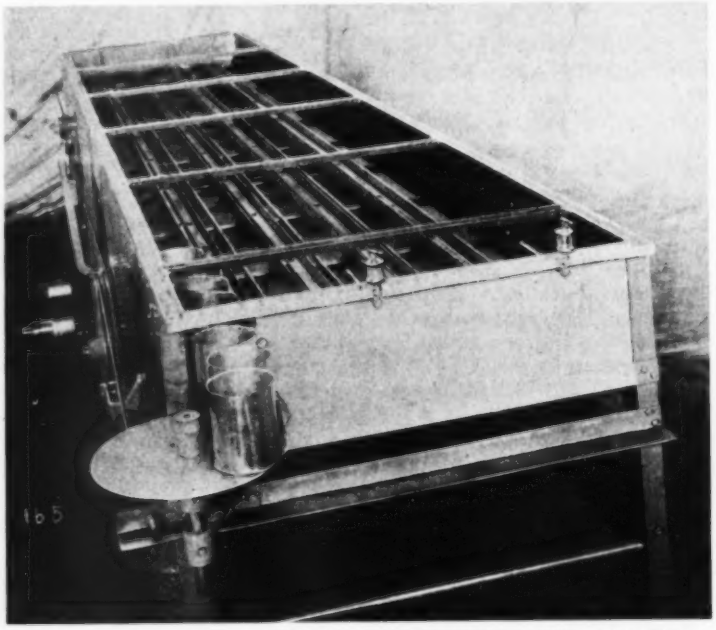


FIG. 1.—A 5-Run, Gallon, Cable Exhaust Box of about 1909. The Water-Seal Cover has been Removed.

The Chain Type.

The cable exhaust box was very shortly replaced in fruit canning plants by the chain exhaust box. This exhaust box, as shown in Figs. 2 and 3, was built on the same principle as used in the cable exhaust box with chains replacing the cables. This change eliminated the slipping and binding of cables so often experienced in the cable boxes. However, it had two serious objections in that the chains often broke or jumped off the sprockets under peak loads, and that it was unpleasant to work near these exhaust boxes because of objectionable squeaks caused by the rubbing of chains, which were very difficult to eliminate. The sale of the chain type of box was discontinued about 1919.

The Pipe Type.

At about the time the chain exhaust box had a wide use in fruit canneries (1910-1919) a pipe exhaust box was developed and used in fish canneries (see Fig. 4). It was a simple, durable, and efficient machine that gave satisfaction in the canning of fish. It consisted of a pipe 20 or 30 feet long, which had a double shell into which steam could be admitted at boiler pressure. In addition to steam in the shell, open steam coils were used inside the exhaust box. Owing to the special construction, exhaust tempera-

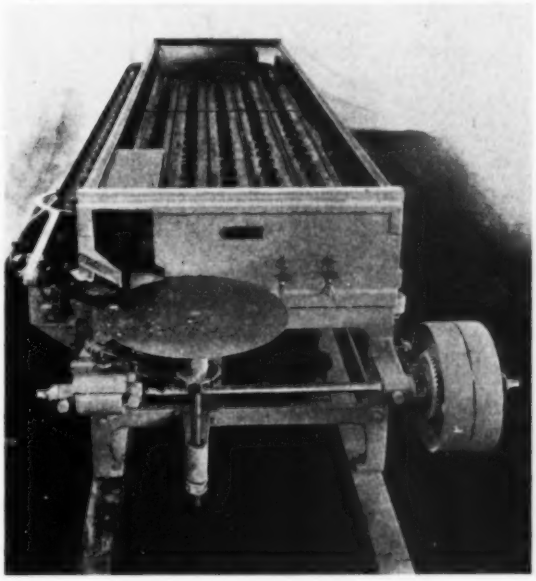


FIG. 2.—The Chain Exhaust Box.

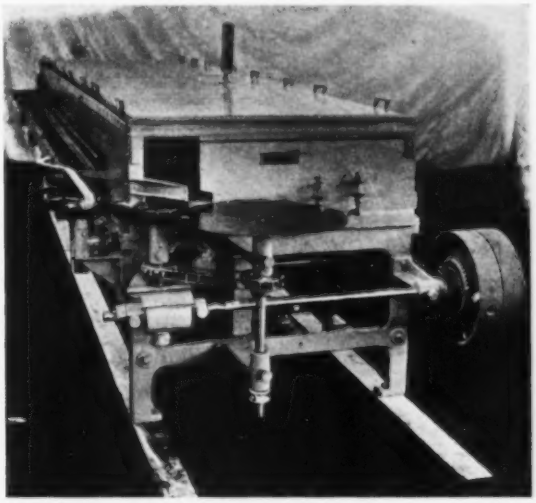


FIG. 3.—The Chain Exhaust Box. Drive End View.

tures as high as 230° to 240° F. could be reached. The sale of these exhaust boxes was discontinued in about 1919 when the more modern disc type of machine became popular.

The "Spiral" Type.

In some fish canneries the conservation of space was of prime importance, so in order to meet this demand a peculiar exhaust box known as the "spiral" type was developed. It was used for exhausting No. 1 oval fish cans by some fish canneries until about 1927 (see Figs. 5 and 6). The cans fed in at the bottom and through a spiral arrangement worked out through the top, where they were discharged on a spiral chute. With these machines a shorter period of exhausting was possible than that used at present. The machines were operated at about forty to forty-eight cans per minute, and were heated with wet steam.

The Rotary Type.

The rotary exhaust box was developed about 1920 (see Figs. 7 and 8). The machine consisted principally in a revolving set of swinging shelves operated by Geneva motion. It was heated by wet steam. Several of these machines were installed in various canneries, and there are several still in use. Some canners prefer the rotary machines to the now com-

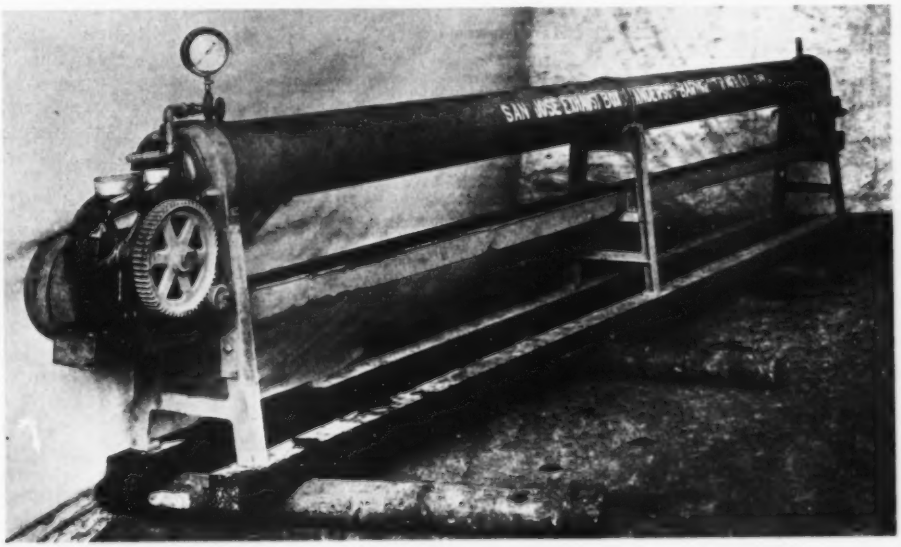


FIG. 4.—The Pipe Exhaust Box.

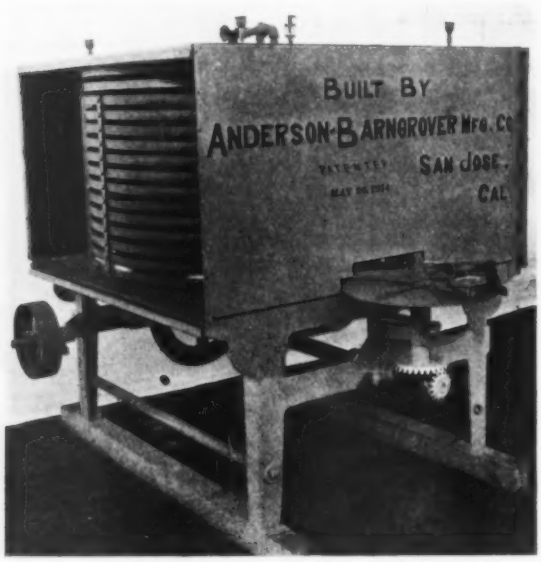


FIG. 5.—The Spiral Exhaust Box. Feed End.

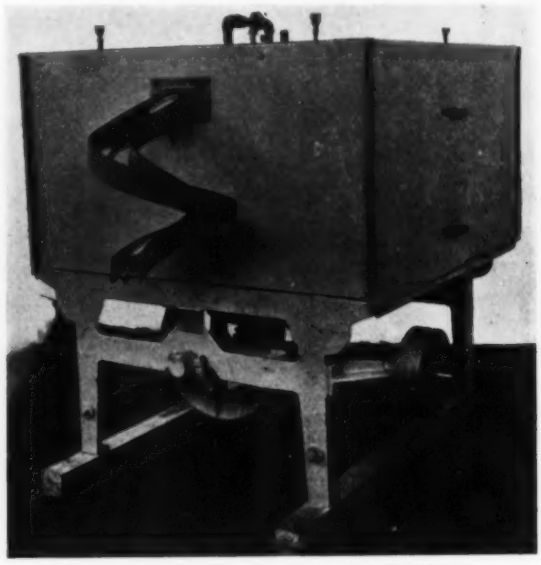


FIG. 6.—The Spiral Exhaust Box.

monly used disc types; however, this is probably a matter of sectional viewpoint rather than mechanical advantage. In view of the failure of this machine to receive widespread acceptance by canners, its manufacture and sale have been virtually discontinued.

The Travelling Disc Type.

The travelling disc exhaust box was one of the oldest types used, but discussion of it has been deferred because comparatively recent changes have resulted in its very widespread use. It is the most commonly used exhaust box by fruit canneries to-day.* As formerly built (see Fig. 9), it did not keep pace with the demand for the large capacity lines of to-day. Furthermore, it was usually difficult to obtain a temperature higher than 190° to 200° F. in the box. By an ingenious rearrangement of the discs, the capacity of an exhaust box of a given size has been greatly increased (see Fig. 10). Even though this three double run exhauster greatly increased the capacity for a given floor space, it did not meet all requirements of extra-large capacity within a reasonable floor length. Thus it was that the double deck disc exhaust boxes were evolved (see Fig. 11). These recent developments in exhaust boxes have enabled canners to increase the speed of their lines from twenty-five to thirty cans a minute of a few years back to 125 to 160 cans a minute, in some instances, to-day. In these later types of boxes it is possible to obtain temperatures ranging up to 212° F. so that the time required for heating has been shortened.

As the preceding discussion indicates, the definite trend in the development of the wet steam exhaust boxes has been toward increased speed and efficiency. Some canners, however, contend that high temperature wet steam exhaust deteriorates certain products, particularly berries, cherries, and highly coloured fruits that lose their colour readily. It is possible for these canners to obtain disc type *hot water exhaust boxes*, which are fundamentally the same as disc steam exhaust boxes except that the heating medium is hot water.

Most modern exhaust boxes are equipped with temperature controllers in the cannery so that the temperature may be carefully regulated. In high speed lines running at a hundred or more cans a minute it is essential to use temperature controllers in order to safeguard the canner against losses from improper exhausting.

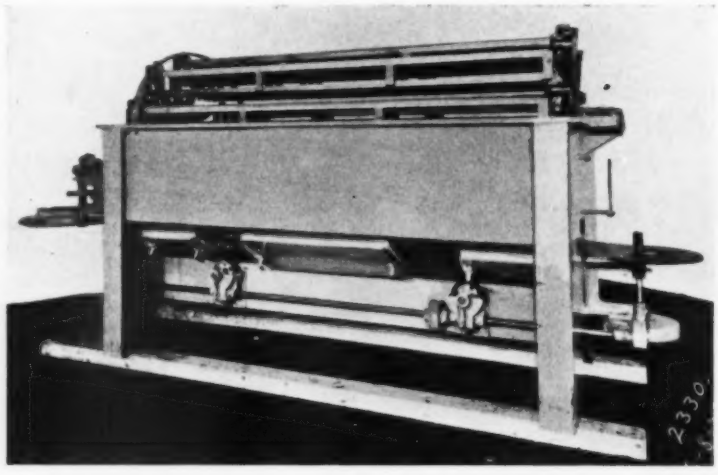


FIG. 7.—The Rotary Exhaust Box. Side View.

* The authors are mainly discussing Californian practice. In the Eastern States it is probable that the "Peerless" type of rotary exhaust box finds greatest popularity.—EDITOR.

The Spiral Chain Type.

The most recent and specialised development in exhausting equipment is the spiral chain type of machine (see Fig. 12) for use in fish canneries. It is specially designed to handle a large capacity of No. 1 oval fish cans in a limited floor space. It is well adapted for use in the new cold pack method of canning sardines. The machine has been used recently in packing other irregular-shaped cans such as those used for plum puddings and meats.

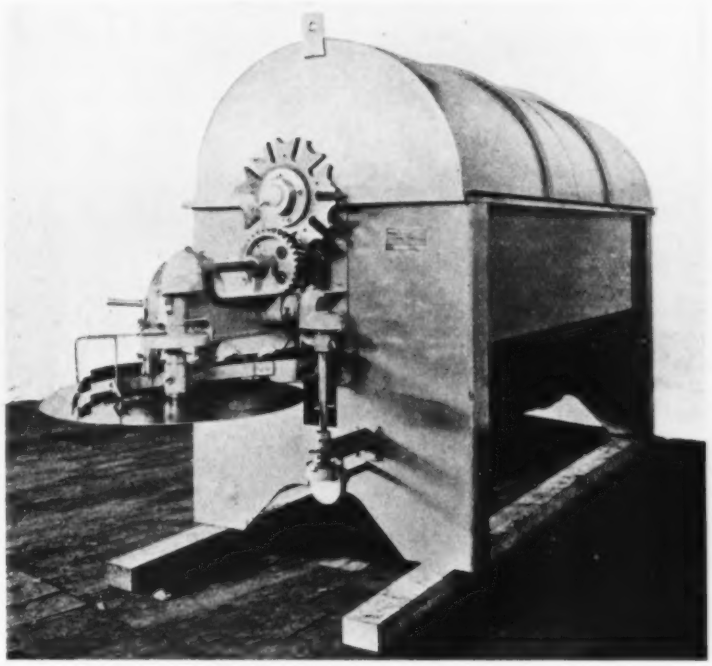


FIG. 8.—The Rotary Exhaust Box. End View.

In the discussion of the development of exhaust equipment, the relative position of the machine in the cannery has not been mentioned. Since one purpose of the exhausting process is to obtain a partial vacuum in the cans, it is important that the cans be sealed as hot as possible. The distance of the exhaust box from the sealing machine plays an important part in maintaining the heat in the can after it leaves the exhaust box. Cans cool rapidly upon leaving the exhaust box, so they should not be required to travel a considerable distance in the open before reaching the sealing machine. Some canners, realising the importance of maintaining the temperature, have installed steam-heated hoods over the runway from the exhaust box to the sealer.

The Tucker Type.

Departing entirely from the ordinary disc, chain, or conveyor type of exhauster is the new eccentric plate type (see illustration on page 308) designed by John T. Tucker of California. It is understood that this machine is in successful use by Libby McNeill and Libby in California.

A novel method is employed in conveying the cans through the machine by means of a combination of forward and lateral motions on the eccentric principle. The cans are carried on plates or strips of non-corrosive metal between brass guides, the plates operating parallel to each other and alternately passing under the cans, moving them forward with a gentle agitating motion. It is stated that this exhauster is capable of handling 120 to 150 of No. 2½ cans and from 150 to 200 of the smaller sizes. It is adapted to all shapes of cans. Noise and vibration are said to be practically eliminated.

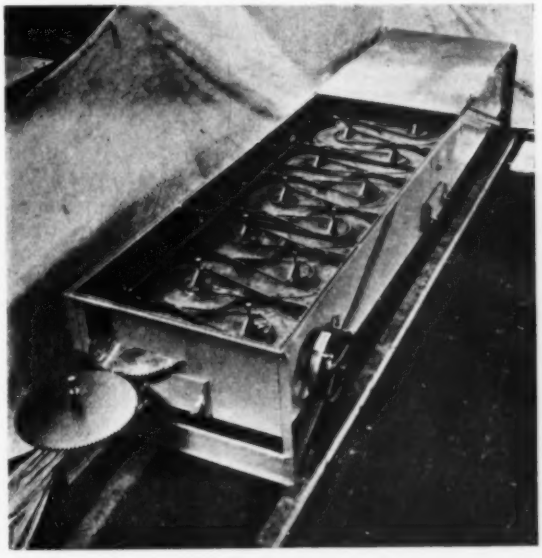


FIG. 9.—Hawkins' Exhaust Box. Old Type.

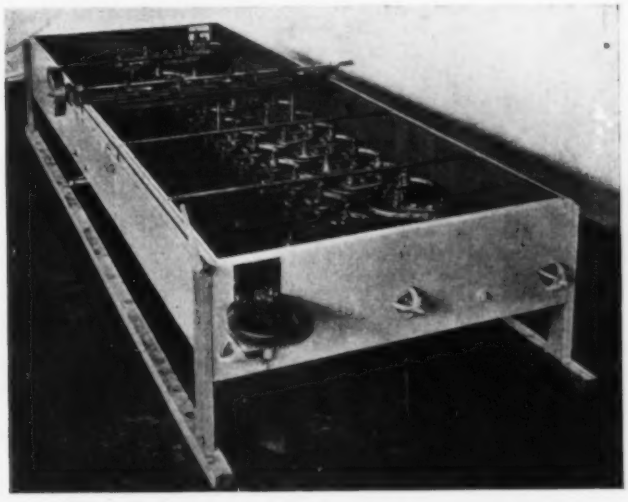


FIG. 10.—Disc Exhaust Box with Re-arranged Discs.

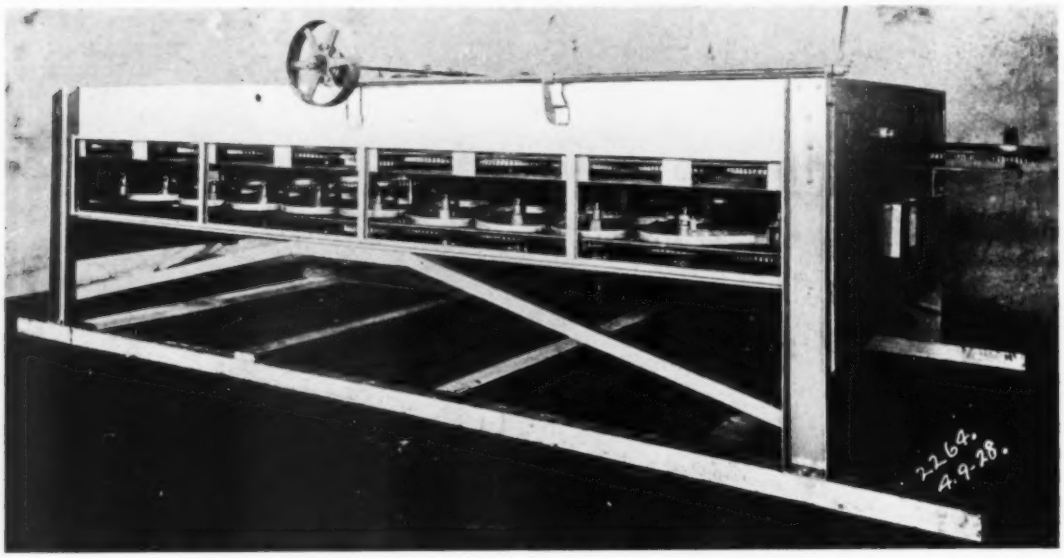


FIG. 11.—Double Run, Double Deck, 16-inch Exhaust Box.

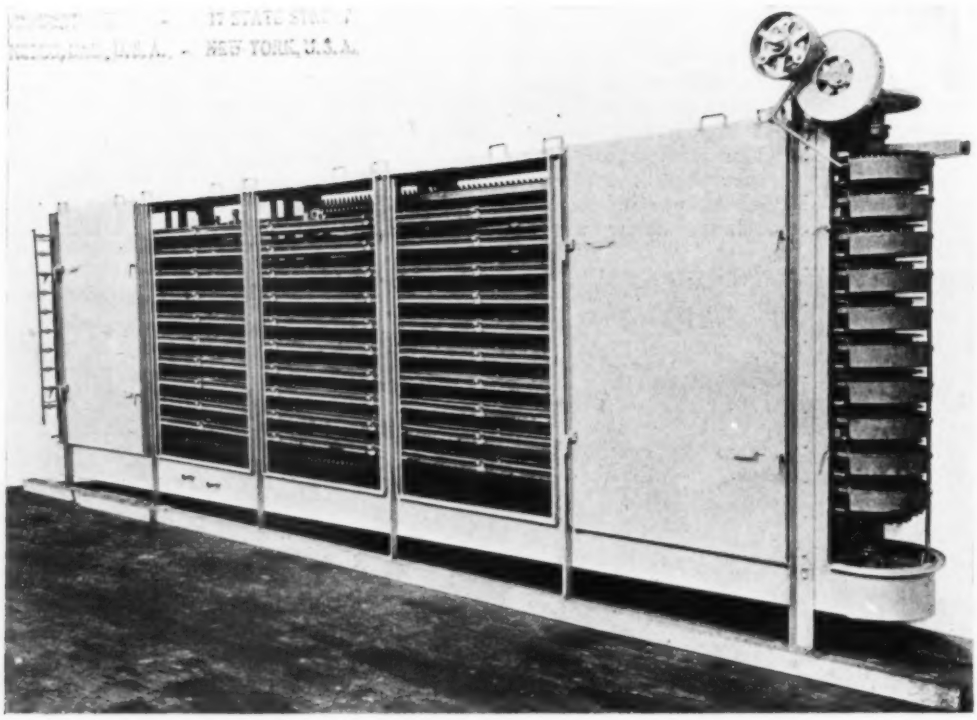


FIG. 12.—21-Run, Spiral Chain Exhaust Box for Oval Cans, 926 Cans Capacity.

The discussion of the development of vacuum can closing machines is continued by the authors on page 308.

STANDARDS OF QUALITY

FOR CANNED FRUITS AND VEGETABLES

The Author's Views are based on both English and American Experience

THE GROWTH of the canning industry in England will undoubtedly lead to increasing interest in the question of grades or standards of quality for canned fruits and vegetables. In fact, continued prosperity will depend upon the setting up of high standards of quality and adherence to these standards.

The formulation of scientific standards for canned food is necessarily a rather complex problem. Most buyers of canned foods on a large scale have probably devised methods of evaluating the various samples submitted to them, but the development of uniform scientific standards has been slow, although it has made considerable progress in the United States. In most cases the initiative has been taken by the manufacturers themselves, in co-operation with the States authorities, in order to build up a good reputation for the canned goods of the particular State in which they happen to be located.

The canning of tomatoes illustrates the necessity for quality standards. Originally developed in the Eastern States, this industry tends to centre in the mid-West nowadays, due partly to the poor quality of the tomatoes packed by some of the Eastern canners. The growth of the tomato juice industry will be severely hampered unless definite steps are taken to control and standardise the quality. A few poor quality cans of any product will not only discredit the brand of the manufacturer in question, but will discredit all cans of the same product to some extent, and also the canning industry as a whole.

The only practicable way to indicate the quality of a canned food (apart from the building up of goodwill by individual manufacturers for the high quality of their own names and brands) is by suitable designation on the label, which will enable the purchaser to recognise different grades or qualities. For example, certain definite grades of Californian canned fruit have been accepted by the Canners' League of California backed up by the State authorities. The fruits are classified in descending order of quality as fancy, choice, extra standard, standard, and seconds. Fancy fruit is packed in the heaviest syrup and seconds in very light syrup or, usually, water. The points considered in making this classification are colour and ripeness of fruit, freedom from blemishes, and uniformity of appearance.

From the consumer's point of view it is possible to criticise these standards as placing undue emphasis on appearance and not enough on flavour and eating qualities, which is a common fault with most standards for canned fruits and vegetables. It is doubtful if the argument is wholly sound that if the fruit is ripe and of good appearance the flavour will take care of itself, but no doubt the personal element involved in estimating flavour values makes this aspect difficult to include in the standards. In addition, the drained weight of the fruit must conform to the standard set by the United States authorities, and fairly rigid limits are set for the variation permitted in the number of pieces of fruit for each size of can, thereby ensuring a very uniform product in appearance. As the result of the enforcement of these standards the purchaser of a can of Californian fruits can recognise and appreciate the difference between Fancy and Standard quality when he sees these designations on the label.

Canada has very similar regulations enforced by the Ministry of Agriculture, specifying for each particular fruit the characteristics for each grade, strength of syrup to be used, amount to be filled in each size of can, and definite labelling requirements.

Wisconsin is one of the leading States engaged in pea canning in the United States, and a comprehensive scheme of grading and labelling has been worked out. In the first place, canned peas are defined as the canned vegetables prepared from the fresh immature seeds of the common or garden pea, by shelling, winnowing, and thorough washing, with or without pre-cooking (blanching), and by the addition before sterilisation of the necessary amount of potable water, with or without sugar and salt. The variety of the pea (early or sugar pea) must be stated on the label, and the grades defined are fancy quality, extra standard, standard, and substandard, the grade being determined by the "succulency," flavour, and uniformity of the peas and the clarity of the liquor. In addition, the size of the pea must be marked on the label as determined by the size of the sieve through which the pea will pass before blanching, ranging from No. 1 peas passing through $\frac{9}{32}$ inch mesh screen to No. 6 peas which are too large to pass through $\frac{13}{32}$ inch screen. Canadian regulations are similar, differing chiefly in the description of the factors to be considered in determining the grades.

Another system of grading is that carried out by the Bureau of Agricultural Economics of the United States Department of Agriculture in the Administration of the Federal Warehouse Act. Under the terms

of this Act, a canner who stores his products in a warehouse licensed by the Federal Government may, on payment of a small fee, have his goods officially graded by a recognised Government expert. This grading showing the quality of his goods, and the warehouse receipt showing the quantity of the goods, may then be used by the canner as security in financing his future operations, and the method is apparently being widely used. The system of grading set up for this purpose appears to be the most scientific basis suggested up to the present time. For each product a series of factors are specified and a numerical system is adopted for expressing the extent to which the product complies with each factor. The total score made by the sample determines the grading. With canned peas, for example, points are allocated as follows:

Clearness of liquor	15 points
Absence of defects	15 ,,
Uniformity of size, type, colour	10 ,,
Tenderness and maturity	35 ,,
Flavour	25 ,,
	— ,,
	100 ,,

Fancy quality or U.S. Grade A peas must score 90 points or more by this system. Other grades recognised are extra standard (choice) or U.S. Grade B, scoring from 75 to 89 points, standard quality, U.S. Grade C, scoring from 60 to 74 points and substandard or off-grade peas. Very definite specifications and directions for allotting points are given, so that with suitable training uniform results can be obtained by graders in different localities. Products graded under this system must, of course, fulfil the ordinary requirements of the Food and Drugs Act (for example, no colouring material may be added; canned dried peas are always regarded as substandard and must be so labelled). The containers must come up to definite standards for headspace and proportion of fruit or vegetable in the can. Definite standards have been adopted so far for corn, peas, tomatoes, and Lima beans, and tentative ones for string beans, pumpkin, spinach, beets, sauerkraut, and grapefruit.

These standards, however, are not mandatory on the canner, and as far as the purchaser of the can is concerned are not wholly effective in ensuring proper description of quality on the label. The Federal Government has recently entered the field with the object of correcting this condition from the consumer's point of view. Under the terms of the McNary-Mapes amendment of the Food and Drugs Act, as promulgated in 1930, the Department of Agriculture is empowered to set standards of quality for all products except meat and milk, packed and sterilised in hermetically sealed containers. All products which fail to come up to the Government standards must bear conspicuously a statement to the effect that the goods in question are substandard. Where the can is not more than 90 per cent. filled the can must also be marked slack-filled. So far, by co-operation between the Government and the canners, definite standards have been set for peas, pears, peaches, apricots, tomatoes, and cherries.

The setting up of these standards has entailed a large amount of discussion and experimental work. The Government felt that, as tenderness was such an important factor in determining the quality, some accurate and reproducible method of measuring *tenderness* should be available. A device was developed (described in Circular No. 164 of the Department of Agriculture, April, 1930) which it is hoped will be of wide application in the inspection of canned fruit and vegetables. In determining the tenderness of peas, for example, the half pea is crushed to one-fourth of its original thickness by applying to the surface of the pea a definite weight increasing at a standardised rate. The end point of the crushing is determined by an electrical contact and the weight necessary to effect the crushing is a measure of the tenderness. For fruits, the penetration of a standard cylinder into the fruit is the basis of measurement. By means of this instrument a mathematical expression can be given to the tenderness—*e.g.*, peas are considered tender if 90 per cent. or more by count are crushed by a weight of less than 2 pounds tested by the standard method. Peas must also be normally coloured, with not more than 4 per cent. by count of discoloured peas, and 80 per cent. of the peas must be unbroken if the can is to avoid the substandard label.

The Government has also placed the measurement of *colour* on a quantitative basis in the case of canned tomatoes. It is stated that the fruit shall be considered normally coloured when a sample at least 1 inch deep of the homogeneous pulped product shows a red colour containing at least 58·0 per cent. red and not more than 37·3 per cent. green in terms of the three primary colour distribution curves of the Optical Society of America referred to the Abbott Priest standard white light. The colour is usually determined by matching with a set of standard Munsell colour discs operated under standardised conditions.

These definitions for tenderness and colour seem rather terrifying at first sight to the average canner who has not the equipment or training to make the necessary tests. Consulting chemists specialising in the canned food industry have been kept busy examining samples to determine their conformity with the standards, and the National Canners' Association has been very active in the inspection of cans packed by its members and in the actual working out of the standards.

Some criticisms have been made of the various details of the Act. Originally substandard goods were called upon to bear very conspicuously the statement, "Below U.S. Standard—low quality but not illegal." It was felt that this wording would be likely to cause suspicion that the products were actually below the standard fit for use as food and it

is now suggested that it be changed to read, "Below U.S. Standard—good food but not high grade," thereby indicating that the product is wholesome but of poor quality. Tomato canners are complaining that the *peeling requirements* are too strict. A limit of 1·5 square inches of peel per pound is the maximum allowed, which is claimed to be too stringent in view of the difficult nature of the peeling operation and the more liberal tolerance allowed in the peeling of pears and other fruits. This argument would appear to carry some weight in view of the fact that raw tomatoes are normally eaten with the whole skin intact, but so far the Government has not suggested any modification of the original definition. There is no doubt that the industry as a whole will conform to the Government's standards, and as there is a natural desire to avoid the use of the sub-standard label this will naturally lead to a higher general standard of quality.

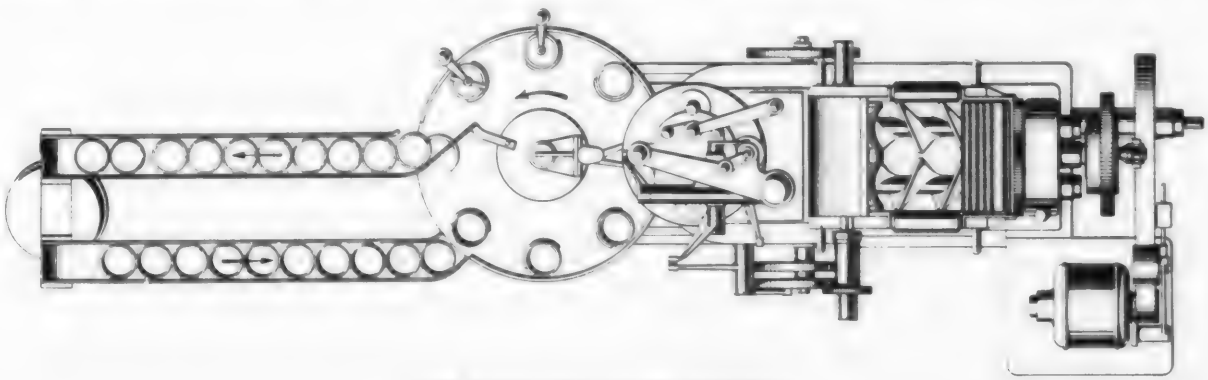
The canning industry in England is developing rapidly, and it would be worth while to consider the question of the adoption of a more complete official system of quality grading than is at present in effect, profiting by the experience of Canada and U.S.A.

The Agricultural Produce (Grading and Marking) (Canned Vegetables) Regulations, setting grades for select fruits and vegetables, is a step in the right direction. A logical development would be a series of definitions for each product, after the pattern of the Canadian Meat and Canned Foods Act, backed up by a scoring system for determining the various grades on the lines of the work of the Bureau of Agricultural Economies of the United States. This programme would call for a large amount of work by the Ministry of Agriculture, the National Canning Council, and the research associations connected with the industry. The establishment of definite grades and standards of quality in the early stages of the industry, which can be readily recognised by the consuming public, should result in a firm foundation upon which the English canners can build an industry able to compete with any in the world, and should amply repay the effort involved in the setting up of these standards.

Butter Canning

We are informed that Messrs. Kustner Brothers and Co., Ltd., of Switzerland, have designed and are constructing a machine for the canning of butter. This machine consists of two parts, one for moulding the butter and the other for filling it into the cans. The former delivers 1-lb. lots of butter, accurate to within 1 gm., and can work with butter of varying consistency, ranging from a hard product at 6° to 8° C. below zero to one of a fair consistency. The filling machine consists essentially of a revolving table having eight divisions. The cans are placed by an operator on a conveyor which feeds them on to the table. As each box comes under the moulding machine it receives a cylindrical portion of butter of slightly less diameter than that of the can, but of slightly greater height. A special cutting device prevents the butter from sticking to the plunger of the moulding machine. On rotation of the can to the second position, a wooden die comes down on the butter and presses it into the can so that it occupies its total internal volume. One division further on is a device for cleaning the top of the can preparatory to placing on the lid. The eighth division is occupied by the extracting apparatus which transfers the cans from the table to a conveyor, where the operator checks the correct filling before placing on the lid. The closing is done by an ordinary double seaming machine.

Stainless steel is used for all parts that come into contact with the butter.



The Kustner Butter Canning Machine.

TOMATO CANNING

Success comes in Cans Not in Can'ts

THE CANNING and manufacture of tomato products is an industry of considerable magnitude in the United States. It is estimated that about 250,000 acres are devoted annually to the growing of tomatoes for canning and manufacturing, yielding over 1,000,000 tons of tomatoes, valued at $20,000,000 in 1930. The pack of canned tomatoes is usually from 10,000,000 to 15,000,000 cases of No. 3 cans per annum, depending on conditions. In addition, tomato catsup (valued at over $20,000,000 in 1929) is manufactured in large quantities, as well as considerable amounts of tomato pulp or purée, tomato soup, and tomato paste. Within recent years tomato juice has made tremendous strides, the pack in 1930 being estimated at 750,000 cases. The principal tomato regions are Maryland, California, Indiana, New Jersey, and Virginia, although many tomatoes are canned as far south as Missouri and as far north as the Canadian border of New York State.

Obtaining Supplies.

In all tomato products the raw material is of prime importance. In order to ensure adequate supplies, both as to quantity and quality, the manufacturer usually contracts with the farmer or grower for a definite acreage at an agreed price, in many cases specifying the variety of tomato to be grown. Within recent years the tendency is to buy "on grade," particularly with the better class manufacturers. The United States Department of Agriculture has established definite grades or standards for tomatoes for canning purposes, taking into account questions of soundness, colour, ripeness, and freedom from defects or contamination. A higher rate is paid for first grade, or U.S. No. 1 tomatoes, a lower rate for No. 2's, and nothing for culls. Size is also important in tomatoes for canning, and is generally specified in the contract with the grower. By this system the manufacturer obtains a better quality raw material, and the grower is encouraged to adopt better methods of cultivation and picking in order to obtain higher financial returns. This system of buying could with advantage be applied to other cannery products, but, of course, calls for co-operation between the manufacturer, the grower, and the inspection authorities, who are trained Government or State officials.

FIG. 1.

From the sorting tables the tomatoes are carried on mechanical conveyors to the scalders, first passing through jets of cold water (as shown above). They are then immersed in hot water and live steam, followed again by another cold dip.

(Courtesy of the National Canners' Association.)

Arrival at Factory.

Delivery of good tomatoes will not ensure a good finished product, even with canned tomatoes where the technique is relatively straightforward and the procedure fairly well standardised. Prompt handling of the raw tomatoes is essential to prevent deterioration. During the canning seasons, temperatures in the daytime in most of the States will be from 80° to 90° F., or higher, with high humidity, affording conditions very favourable to the growth of moulds, yeasts, and bacteria. It is difficult to pick and transport tomatoes without injuring the

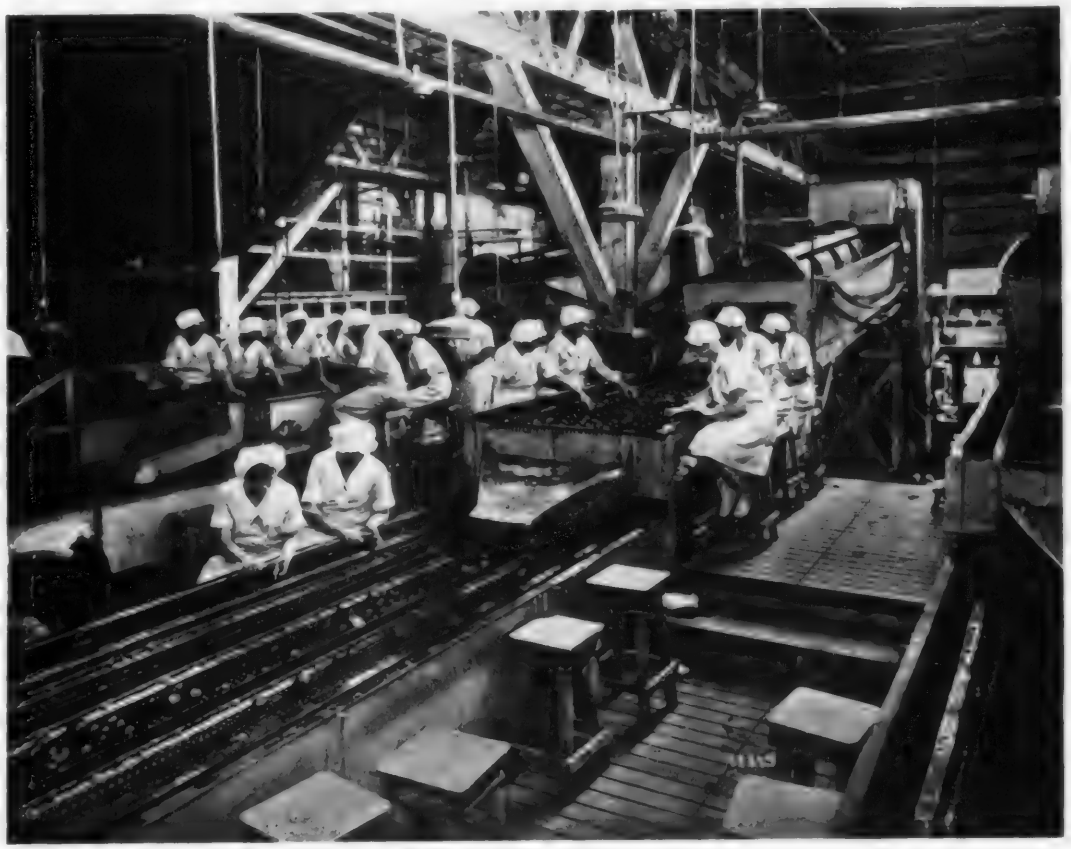


FIG. 2.—Sorting Line for Tomatoes.
(Courtesy of the Jeffrey Manufacturing Co.)

FIG. 3.—Merry-go-Round Peeling Table.
(Courtesy of the Jeffery Manufacturing Co.)

FIG. 4.—Tomato Filling Table.
(*Courtesy of the Sprague Sells Corporation.*)

fruit to some extent, which frequently leads to spoilage, beginning within a few hours after picking. Tomatoes are therefore dealt with as soon as possible after delivery at the cannery.

Washing and Scalding.

The baskets or boxes in which they arrive are usually dumped into a soaking trough, to remove adhering soil, and then passed through a mechanical washer, in which they are subjected to powerful sprays of water under pressure. After preliminary sorting to remove undersize or unsuitable material, the washed tomatoes proceed through a scalder, where jets of live steam help to loosen the skin, and also assist in the cleaning process.

Peeling.

The next stage is the peeling, trimming, and coring, to prepare the tomatoes for packing in cans. This peeling and trimming operation is very important and is almost always done by hand, involving a large amount of labour. The tomatoes for peeling are usually handled in buckets or similar containers, and special peeling tables or "merry-go-rounds" have been designed to facilitate the handling and supervision of the tomatoes and the work of the trimming operators. All skin must be removed from the vegetable; the cores and greenish sections must be cut out, and, of course all, pieces of rotten or blemished fruit eliminated. At the same time the original shape of the tomato must be preserved as far as possible. Very careful supervision of this operation is necessary to ensure optimum quality, with minimum cost.

Grading and Filling.

After peeling, the tomatoes are sorted before packing into cans, being graded for fancy, extra standard, and standard, according to colour, size, and general condition of the vegetable. Fancy tomatoes are filled by hand, but mechanical devices are usually employed to facilitate packing of standard grades. The tomatoes are kept as whole as possible, since the presence of whole fruit is taken into account in grading the canned product. Juice drained from the peeling tables may be added to complete the fill of the cans, but water constitutes an adulteration. Salt and sugar may be added if their presence is declared on the label.

Processing.

The method of processing varies greatly in different parts of U.S.A. The following account applies more particularly to eastern practice.

After packing the cans are given a short exhaust varying from 3 to 10 minutes at 190° to 200° F.,

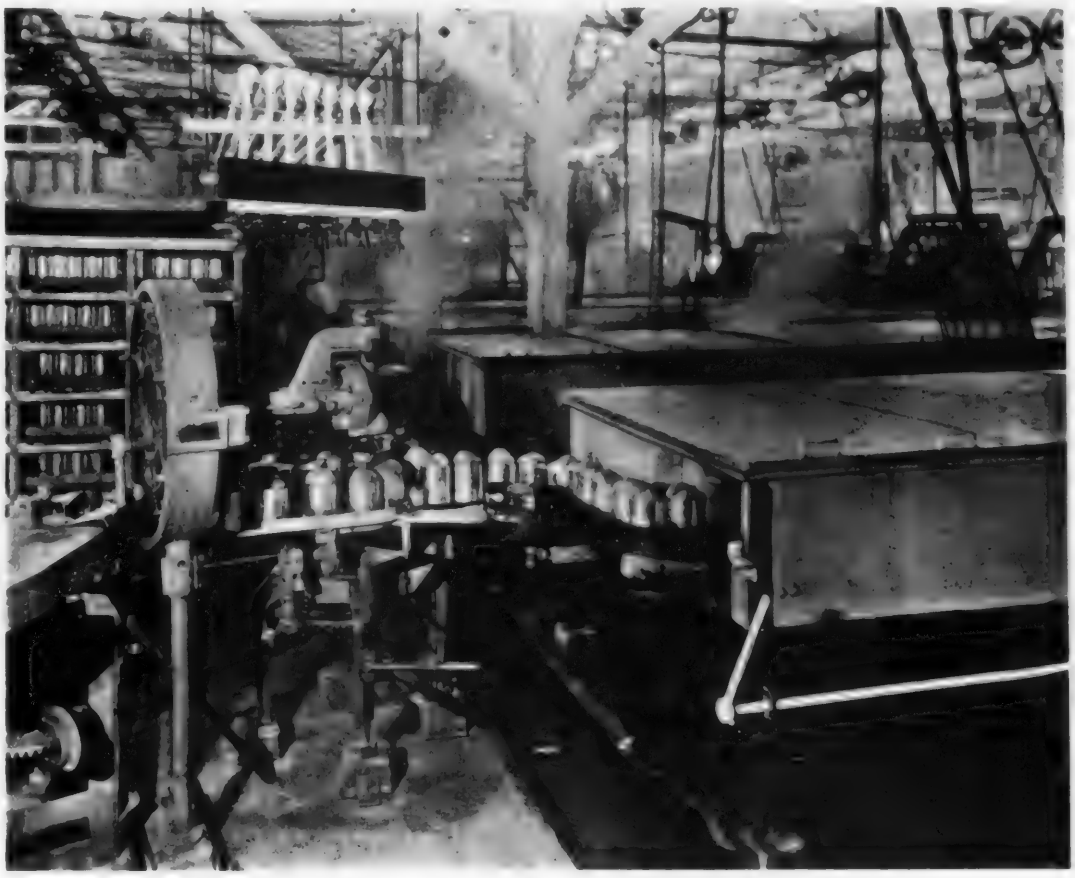


FIG. 5.

After leaving the canning tables, the filled cans are placed on the feeding table (left), and conveyed through the exhaust box (right), where they are heated until all excess air is driven out.

(Courtesy of the National Canners' Association.)

depending on the size of the can, and after sealing are processed at 212° F. The time is usually about 20 minutes for No. 2 cans holding about 1¼ lb., but should be regulated so that the minimum temperature in the can at the end of the process is 185° F. for water-cooled, or 170° F. for air-cooled cans.

The *p*H value of tomatoes is about 4·2, and, therefore, they are in the class of acid products, although being rather close to the generally accepted limit of 4·5, which divides products easy to sterilise from the more difficult range of 4·5 to 7·0. In some canneries the cooked cans are air-cooled, in which case a somewhat shorter process may be used, but a better quality product is obtained by water-cooling immediately after processing.

Spoilage.

Provided that sound tomatoes are used, a good seal is obtained, and a temperature of 185° F. reached in the can, no spoilage should result. Research workers have isolated 266 different forms of organisms which can cause spoilage in tomato products, mostly acid-forming bacteria and yeasts, but all have low heat resistance and are killed instantaneously at 180° F. As, however, even a few minutes' extra cooking will cause a deterioration in the colour, flavour, and general appearance of the canned tomatoes, there is a tendency to cut the process to a minimum, which sometimes leads to spoilage, particularly if the tomatoes used are not in first-class condition before packing. Flat-sour spoilage is most serious, as it cannot be detected until the can is opened, but should not occur if sound tomatoes are properly handled throughout the process. In all tomato products frequent and thorough cleaning and scalding of the equipment is essential in order to prevent multiplication of spoilage organisms.

Grading the Product.

In the actual grading of canned tomatoes, the factors taken into consideration are fill, colour, flavour, drained weight, and freedom from peel or blemishes. The operations of sorting, handling, peeling, filling, processing, and storing must all be planned and carried out with these factors in mind, in order to produce a high quality product.

MAKING MINCEMEAT

By JOHN ELSBURY

FERMENTATION, brown mould, and white maggot, derived from the apples and dried fruit, are the chief sources of trouble to the mincemeat maker. If, however, the apples have been treated with SO_2 (see this journal, July, 1932, p. 205) the danger is not so great. Much depends on the degree of care exercised by the maker himself. Above all, cleanliness and protection from every possible source of contamination is of the highest importance.

Everything should be in a dry condition, including the hands. If mixing is done by hands, these should be thoroughly cleaned, dried, and then rubbed over with glycerine. If machinery is used, all parts should be cleaned and dried, and then rubbed over with a dry cloth moistened with glycerine. Similarly, the mixing trough must not be wetted, but should be cleaned out each time by a rubber squeegee. Wooden tanks which have been wetted are a great source of danger.

The apples should not be brought into contact with iron, otherwise darkening will result. Basins and knives should be of stainless steel.

The raisins (seeded) are cleaned and picked over by hand, to remove stones, grit, nails, etc., and then rubbed over with a little glycerine. The currants and sultanas may have to be wet-cleaned, in which case they should be placed on a tray, dried, and then picked over for stones, sticks, etc. After this they are rubbed over with glycerine.

Some makers like to steam their dried fruit, which is quite permissible providing they are subsequently treated with glycerine, or placed in a high-boiled syrup and drained.

The suet is best rubbed with a little of the salt (about ¼ lb. to 112 lb. of suet). The cut peel should be well syruped, and should also be bright and sweet. Low syrup peel will cause fermentation very quickly.

The actual proportions of the various ingredients used vary with the class of trade in view. Thus, starting with 100 lb. each of chopped apples and white sugar, one would use, say, 15 to 25 lb. of sultanas, 55 to 63 lb. of currants, 30 to 35 lb. of lemon and orange cut peel, and 1½ to 3 lb. of salt. Suet may, or may not, be used—say, 12 lb. or perhaps four times this amount for mincemeat intended for export. Some citron peel may also be added, to the extent of, for instance, about one-quarter of the amount of the other peel. For dry mincemeat for packing into cartons the proportions of sultanas, currants, and suet are increased, while the amount of peel is reduced. Other variations are required in a product intended for export.

The usual flavourings are ground cinnamon, allspice, nutmeg, and oil of cassia. For cheaper grades, oil of pimento and cloves may be also used. About 1 pint of rum to 100 lb. of chopped apples may be used in higher class products; for cheaper grades, this is substituted by rum flavouring and spirits of wine. Other ingredients are acetic acid (say, about ½ pint to each 100 lb. of chopped apples), possibly tartaric acid, and, for cheaper grades, glycerine to the extent of about 3 to 4 pints per 100 lb. of chopped apples.

The general method of preparation is as follows: Chop the apples overnight and place on a table, in order to drain, covering the material with a cloth. Next morning rub two-thirds of the glycerine over the apples, and the rest over the dried fruits. Place the latter in a trough, followed by the apples, suet, and the sugar (which has been passed through a sieve). Now add the peel, salt, and spices (which have been passed through a fine sieve). Mix, sprinkle in the acetic acid, and mix again. Add the tartaric acid (if an ingredient) through a fine sieve and mix again. Then sprinkle the oil of cassia and rum (previously mixed and shaken) over the top of the mass, and mix the whole well together. Allow to stand for an hour before filling.

Wipe the necks of the jars with a little glycerine. Fill with mincemeat. Put on the paper circles wiped with glycerine, and tie over with dry parchment.

Macaroni Machinery

WITH reference to our reply to enquiry No. 793, on page 278 of the September issue, in which we stated that macaroni machinery is built in Italy, it has been pointed out that some of the very finest macaroni machinery is built in France and Germany. For example, Messrs. Baker Perkins, Limited, make macaroni machinery at their German works and, in fact, these works have specialised in such machinery for a good many years. Messrs. Baker Perkins, Limited, inform us that quite recently considerable interest has been expressed in their machinery for use in this country, and at the present moment they are equipping a fair-sized factory and have also supplied smaller machines to another factory. Two comparatively small firms have been making macaroni for some years, and they use plant made by Messrs. Baker Perkins' German works.

Manufacture of Tomato Purée »

An Account of American Practice

TOMATO PULP or purée is manufactured on a considerable scale. This product is largely used in the preparation of tomato sauce for beans, spaghetti, and other manufactured articles, also in tomato soup or catsup, although these latter products are always made from fresh tomatoes by the better class of manufacturers. Tomato purée is often used as an outlet for tomatoes which are too small for canning purposes and, unfortunately, tomatoes which are definitely unripe or otherwise unsuitable sometimes find their way into purée, to the detriment of the finished article. At one time, in fact, trimming, peeling, and cores were used for making this product, but the Federal authorities have now banned the procedure in U.S.A.

Selection.

Manufacturers with a good name to maintain will of course exercise the same care in the selection and handling of tomatoes for purée as they do for other tomato products, but when buying purée from an unknown source it is very important to check carefully the colour, flavour, and mould count, as well as specific gravity, in order to determine if sound ripe tomatoes and proper manufacturing methods have been employed.

Sorting.

The manufacture of purée is relatively straightforward. After washing, the tomatoes pass along a sorting belt, where any which are partly green or show mould spots or unsound portions are either removed, trimmed, or rejected before proceeding through the scalder. Tomatoes which are too small for canning, or large tomatoes misshapen after trimming, are suitable for purée if carefully trimmed to remove green and objectionable portions.

In order to obtain good pulp or purée it is essential for the sorting to be efficient. The sorting belt may consist of a sanitary rubber apron belt, or of woven wire or metal mesh, or of a special roller conveyor type (see accompanying illustration), which ensures thorough inspection of the tomatoes by turning each one as they pass along the line; the actual design and operation of the sorting belt will vary from factory to factory according to conditions. The tomatoes must be fed evenly on to the belt, which should be adequately lighted, and travel not more than 30 feet per minute, with the tomatoes spread in a single uniform layer. The sorting is best carried out by one set of women, with another set doing the actual trimming. Many different arrangements of belts, sorters, and trimmers are in use, depending on the products handled, and average condition of raw tomatoes.

The efficiency of the handling and sorting of the tomatoes is usually checked by the official mould count method, essentially a microscopic examination of the finished product for the presence of mould filaments, which has been standardised and calibrated to give an idea of the condition of the tomatoes used with respect to contamination with moulds, yeast, and bacteria.

Scalding and Pulping.

After scalding—*i.e.*, exposing the tomatoes on a woven wire belt to the action of jets of steam for a minute or so in order to loosen the skin—the tomatoes are dropped through a "cyclone" or pulping machine. This is similar to a sauce or fruit pulping machine as commonly found in England, except that it operates at a much higher speed, and is generally provided with paddles instead of brushes. The skins and seeds are removed by this machine, and the pulped tomato, or "cyclone juice," is transferred to the evaporating tanks. If pumping is necessary, the pipe-line must be of non-corrosive metal, or enamel lined, the latter being usually preferred for economical reasons.

Cooking.

The evaporators consist usually of 1,000-gallon tanks (preferably glass-lined, though cypress is sometimes used) fitted with specially designed copper coils carrying 100 to 120 lb. steam pressure in order to obtain rapid evaporation. So far nickel or other

non-corrosive metals have not found favour as material for constructing the coils. These coils will reduce about 700 gallons of juice to one-half its original volume in 20 to 30 minutes, depending on conditions. Glass-lined tanks are also used for concentrating the juice, and offer definite advantages from the sanitary view-point, but their high cost is a disadvantage.

Evaporation under vacuum is theoretically desirable, but is seldom used in the U.S.A. Apparently the longer time required for evaporation and the greater complexity of the equipment outweigh the benefits obtained from improved colour and flavour, due to the lower temperature of evaporation.

Gravity Tests.

In the United States tomato purée is bought and sold on a gravity basis—*i.e.*, a definite specific gravity 1·035, 1·040, 1·045 is specified. It is very important, therefore, for the manufacturer to have available a rapid method for the determination of the gravity, so that the end point of the boiling can be controlled accurately. If the manufacturer delivers pulp of s.g. 1·042 instead of 1·040, he is really giving away a quantity of purée.

In practice, the specific gravity of the raw juice is first determined at periodic intervals, and assumed to be constant between the measurements. By the use of tables established after careful experimental work by the National Canners' Association, the degree of concentration necessary is calculated, and from the volume of the original juice the volume of the finished batch is determined, and the evaporation continued until this point is reached, as shown by a specially designed gauge stick which reads the volume of the pulp. This is then checked by actual gravity determination.

Direct determination of the specific gravity of a rapidly cooled sample by a specific gravity balance, or with a specially designed pycnometer, is probably the most accurate method. Care must be taken to eliminate air by centrifuging the sample in order to get satisfactory results. This method, of course, takes a certain amount of time, and inevitably a number of batches will have been made before the result is available.

Some advocate the determination of the specific gravity of the filtered pulp by a Brix spindle, and by means of standard tables calculating therefrom the actual gravity of the pulp.*

The refractometer reading of the filtered pulp is apparently the most favoured method at the present

* The specific gravity can also be determined by observing the behaviour of rapidly cooled drops of the pulp in neutral oil solutions of known specific gravity.

Three Roller Inspection Tables Discharging on to Three Inclined Tomato Scalders.
(Courtesy of the Sprague Sells Corporation.)

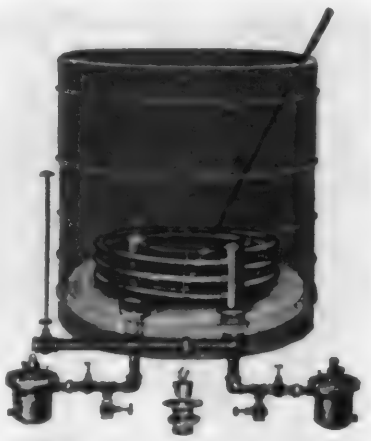
time. Tables are available converting the refractometer reading at various temperatures to total solids and specific gravity, and this method of control, combined with evaporation to a calculated volume as a preliminary guide, enables the end point of each batch to be controlled, whereas other methods will be at best several batches behind, and will in any case be more or less subject to errors due to variation in the gravity of the original tomato juice before evaporation, which is by no means constant.

Finishing.

After evaporation the pulp is passed through a finisher, which may be cylindrical or conical in shape, with paddles or brushes to beat the pulp through a fine screen (about 0·02 to 0·04 inch openings) and remove any particles of skin, seeds, and the like from the pulp.

Filling.

The pulp is then filled at once into cans, and if the fill temperature is above 180° F. no processing is necessary. Syrupers as used in fruit canning are commonly used for filling the pulp. Usually plain No. 10 tins holding about 6½ lb. are used, but often 5-gallon cans lacquered inside with a soldered on cap are employed. Cooling of these large containers is essential, and storage conditions must be carefully watched. Properly prepared purée will keep almost indefinitely, and, of course, finds a use in a wide variety of food products.



An Evaporating Tank for Pulped Tomatoes.
(Courtesy of the Sprague Sells Corporation.)

Fruit Acreage in 1932

The Ministry of Agriculture announces that the total fruit acreage for 1932 shows a net decline of only 300 acres. This decline is not, however, evenly distributed among the various fruits grown. In the case of small fruit there was actually a loss of 2,600 acres, and this was almost balanced by an increase in the orchard acreage of 2,300 acres. There was an increase of over 1,000 acres in orchard cultivation in Kent, while Worcester and Norfolk each increased their orchards by 600 or 700 acres. The main reductions in small fruit acreage were in Kent and Norfolk.

It would thus appear that the fruit-growing areas are more or less constant, and the variations in the type of fruit produced are mainly due to what the grower considers to be the most profitable proposition. It is possible that 1933 will show a greater acreage devoted to fruit. With such import duties as 3d. per lb. on cherries, 9s. 4d. per cwt. on plums, 2d. per lb. on currants, 3d. per lb. on strawberries, in addition to many others, coupled with a thriving and increasing canning industry in this country, if fresh home supplies are not forthcoming there may be a serious shortage of fresh fruit, and such as is available at a prohibitive price.

Food Poisoning

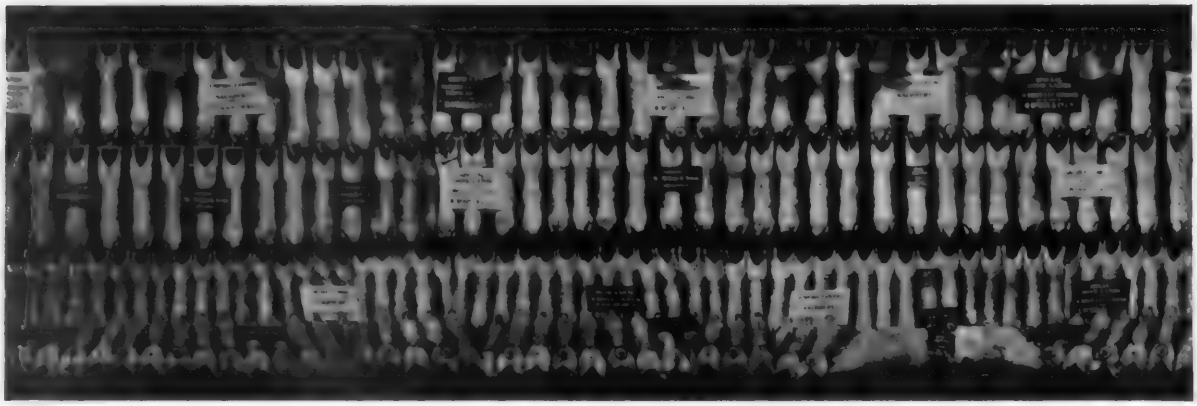
Anyone who wishes to obtain a comprehensive view of the present knowledge relating to the various causes of illness resulting from the ingestion of food should read a paper by Mr. S. Dixon, M.Sc., F.I.C. (Public Analyst, City of Cardiff) presented to the Institute of Chemistry and the Society of Chemical Industry, at the Technical College, Cardiff, on February 19, 1932. This has been issued as a pamphlet by the Institute of Chemistry.

Great credit is due to Mr. Dixon for his lucid statement of the salient features of a difficult subject. He has dealt briefly, at the same time bringing out the main points and maintaining a proper perspective, with diet and disease, chemical poisons of non-bacterial origin, mushroom poisoning, ergotism, weed seeds, poisonous metallic compounds, preservatives in food, "ptomaine" poisoning, food idiosyncrasy, and infectious diseases spread by food.

By common usage the term "bacterial food poisoning" has come to have a restricted meaning. By far the most numerous cases are the result of infection of foods with bacteria of the Salmonella group, the majority of outbreaks being due to *B. ærtrycke* and *B. enteritidis*.

A good account of the theory regarding food idiosyncrasy is given in this paper.

MEAT CANNING



Its Scientific Control »

By T. CROSBIE WALSH
F.I.C., F.C.S.

PART II

ONE OF the hardy annuals which confronts canners is the old problem of "black marks." The author has heard them discussed in Brazil, the Argentine Republic, and Australasia. Many ingenious and often fantastic explanations of their origin have been put forward. Travelling along the Brazilian coast one canner explained, at length and in detail, that they were due (in Brazil) to a certain kind of grass the cattle consumed!

Certain canners tended to adopt "Kismet" as their slogan in connection with this particular trouble, and in some respects they were doubtless right if the view is taken that Allah was responsible for placing the sulphur in the protein molecule.

That the trouble persists is exemplified by the presence of black marks on the contents of cans recently opened. The surface of an unlacquered can containing meat and other products normally discolours to a greater or lesser degree, and this discoloration does not reflect unfavourably upon the quality of the product, although undue blackening may reasonably allow suspicion to arise as to the state of the product prior to canning.

The blackening of the can is due to the action of sulphuretted hydrogen (derived from the sulphur in the protein) upon the iron dissolved in the tin during the process of manufacture of tinplate, and, of course, upon any iron which may be exposed by scratches, bad tinning, etc. In cans with soldered lids, the blackening specially appears where the soldering iron has passed and also against the exposed iron of the cut edge.

The matter has assumed very serious aspects in some cases, as for instance in the canned corn industry of the United States, and a large amount of research has been carried out in that country.

The ingenious device of a zinc-containing lacquer has helped to avoid most of the trouble, though it entails a dearer can than an unlacquered one and does not remove the possibility of unlacquered areas due to the damaging of the lacquer during canning operations.

Other interesting suggestions have been put forward to overcome the trouble, and usually an intimate knowledge of the precise nature of the materials being canned will point the way to its avoidance.

Saltpetre as a Preservative.

This subject was touched upon in a previous article ("The Use of Sodium Nitrite in Canned Meats," FOOD MANUFACTURE, February, 1931), but the matter crops up with such persistency that it may possibly be useful to make mention of further investigations which were made.

In curing meat with saltpetre the quantity used under favourable conditions of time and temperature was 400 grams per 1,000 kilos of meat.

In order to test the effect of saltpetre on the meat during pre-canning operations and after it had left the can, the following tests were made:

Curing was conducted with:

(A) 4,000 grams of saltpetre per 1,000 kilos beef.
(B) 200 ,, ,, ,, ,, ,, ,,
(C) 400 ,, ,, ,, ,, ,, ,,

After canning the colour of the product "A" was more intense, but no difference in the taste was discernible.

The following observations were made:

	A.	B.	C.
Reaction ...	Weakly acid	Weakly acid	Weakly acid
Ammonia ...	Absent	Absent	Absent
After 16 hours at 37° C.			
Reaction ...	Alkaline	Alkaline	Alkaline
Ammonia ...	Present	Present	Present
Smell and taste ...	Good	Good	Good
After 24 hours at 37° C.			
Colour	Diminished	Diminished	Diminished
Smell	Putrid	Very slightly tainted	Very slightly tainted
Sulphuretted hydrogen ...	Abundant	Absent	Absent

The result observed in meat cured with 4,000 grams of saltpetre per 1,000 kilos beef was so remarkable that further tests were made which confirmed the above observations.

The bacterial counts after exposure of the meat to a temperature of 37° C., 24 hours subsequent to the opening of the can, were as follows:

(A) 836,000 total micro-organisms per gram of meat.
(B) 1,022,000 ,, ,, ,, ,, ,, ,,
(C) 824,000 ,, ,, ,, ,, ,, ,,

The general conclusion to be drawn was that, contrary to exercising any antiseptic action, excess of saltpetre had the effect of favouring the development of putrefactive micro-organisms.

By-Product Research

The field for research and routine control in connection with the numerous by-products of a flesh food canning factory is very wide.

Extract of beef is a very large and important item, and its manufacture has been very thoroughly studied, as well as its standardisation and evaluation.

As is well known, extract of beef may be obtained as a by-product of canned meat manufacture, when the cooking liquors are collected and evaporated, or by the direct leaching of lean, fresh beef in fresh water and its subsequent evaporation as devised by Liebig in the eighteen-fifties.

The latter method has problems of its own in the direction of the reduction to the lowest possible amount of the water employed in leaching the soluble constituents of the beef. The temperature at which the beef is leached is also dependent upon the type of product desired.

The former method has its problems of steam economy in evaporation, the nature of intermediate treatments, clarification, and others, also shared by the leaching process.

The analysis of extract of meat is a fairly long and complicated one, involving as it does the estimation of creatinine and creatine by Folin's method as well as some arbitrary methods for the estimation of moisture and solubility in alcohol. That these offer considerable difficulty even to the experienced analyst is exemplified by the discordant results given by different workers on the same sample. This also applies to the analysis of albumoses.

The above points will be elaborated in a future article dealing further with the subject of the scientific control of canning operations.

(To be continued.)

Flavouring Essences

In the flavouring essence industry products are pretty well standardised, and innovations are few and far between. Hence, at the Fifth Chocolate and Confectionery Exhibition, recently held in London, while many excellent flavouring essences were exhibited by the few firms specialising in these products represented, these were mainly of the type which can be described as very well known.

A few of the essences shown, however, may be mentioned as being of recent introduction, or as not yet widely known. Fondants flavoured with, respectively, Bush's artificial coconut essence, and the same firm's artificial essence of Jamaica banana, were found to be quite excellent, the soft flavour of the former making a special appeal to our own palate.

National Drug Industries, Ltd., showed, among numerous other products, an artificial passion-fruit essence, which should be of interest to manufacturers of soft drinks. This firm is a new one, incorporating C. R. Harker, Stagg and Morgan; Haynes, Finemore and Co.; and T. Hodgkinson, Prestons and King. A word of praise should be added for the excellent aroma of this firm's rectified Mitcham peppermint oil.

A trace of diacetyl is the essential flavouring constituent of Fredk. Boehm's butter aroma, which was found to give quite striking results in toffee, the flavour of natural butter being perfectly simulated. Mention may also be made of "Vanillot," manufactured by Cooke, Tweedale and Lindsay, Ltd. This is a vanillin substitute in liquid form, having a flavour stronger than that of vanillin.

A New Kent Cannery

We spent an afternoon at the new "Lady Dane" fruit and vegetable canning factory of the British Fruit, Ltd., situated near Faversham, Kent. It is quite up-to-date in every detail. The situation in rural surroundings is excellent and the transport facilities include a private railway siding. The factory has been well arranged and equipped, and a spacious laboratory forms part of the office buildings. It was interesting to note that all machinery is driven by individual electric motors. In particular, the pea canning line is well worth seeing.

Crab Canning

AT DIFFERENT times in the past we have been asked for information on the canning of crabs, lobsters, and shrimps. We have prepared the following account, which deals with the subject more adequately than is possible in the ordinary course of correspondence. The subject is, however, so wide that considerations of space permit only a cursory treatment.

1.—Crab Canning

The Common Pacific Crab (*Cancer magister*).—Some packers kill crabs by cutting their throats with a knife and allowing them to bleed thoroughly. The majority, however, put them alive in fresh water which has previously been brought to a jumping boil and in which has been dissolved 1 lb. of bicarbonate of soda to 25 lb. of crabs. Here they are cooked for about 20 minutes (the length of time varies somewhat with the size of the crab), after which they are taken out, washed in cool water, and allowed to cool.

The back shell is first removed, when the body is washed under a stream of water. The meat is then removed from the crab, care being taken to see that none of it comes in contact with wood, after which it is washed in cold 1 per cent. brine (1 lb. of salt to 12½ gallons of water), drained, and pressed to remove excess moisture. It is then packed in cans lined with parchment paper (some use cans which, in addition, have been enamelled on the inside, but this is not absolutely necessary), with the addition of enough salt to flavour. Claw meats should be packed at the bottom and top of the can and the centre filled with body meat.

The tops are then put on loosely and the cans exhausted for about 8 minutes at 212° F. The tops are then sealed, the cans put back in the retort and given a cook for 40 minutes at 15 lb. pressure for ½-lb. cans. The cans are generally cooked in the retort before removal. Some canners insist that it is necessary to lay the cans on their sides while being cooked. The times given above are only approximate, since they are influenced by weather, condition, and size of raw material, etc.

The meat may be removed from the shell by hand, or by use of a centrifuge, or by application of compressed air.

Japanese Methods.—With the introduction of floating factories in 1916 the output of canned crabs has been increased enormously. The crab fishing season varies with the territory. In some places it begins in January or February; generally speaking, however, it starts in March and ends in November. Each floating factory is accompanied by five to eight smaller fishing boats. Special nets are left for two or three days before being hauled up. A floating cannery may account for over one million crabs in a season.

The crabs are conveyed from the small boats and are spread on the deck of the mother-ship, and, after the back shells are removed, they are placed in a metal tank, where they are steamed for about 20 minutes, followed by cooling in clean sea-water. They are then cleaned and the flesh is pulled from the body and legs and classified according to quality and condition. The meat is again washed and then packed into cans in accordance with the standards laid down in the Government regulations. The cans are lacquered twice (it is stated) and lined with parchment paper, in order to avoid direct contact between the meat and the can. Temporarily covered, the cans are conveyed to the exhaust box and exhausted at 205° F. (approximately). They are then double-seamed, sterilised, and kept retorted at 3½ lb. steam pressure for about 1½ hours.

J. N. Cobb's account of processing is as follows: "When ordinary water exhaust boxes are used, the cans are first heated for an hour at 212° F. The cans are taken out, vented, tipped, and cooked again for 1½ hours at 212° F. With steam heating at 3 to 5 lb. (222° to 228° F.), the first cooking period is 40 minutes, and the second is 1 hour 20 minutes at 4 lb. pressure (225° F.)."

Packing in Glass.—Experiments were carried out three or four years ago by P. R. Nelson and other members of the laboratory staff of the Glass Container Association (U.S.A.) to determine the best method of processing crab meat in glass. The following particulars are taken from Nelson's report:

Crabs are usually given a 20-minute cook in either steam or water as soon as they reach the factory in order to kill them and to loosen the fresh meat from the shell. It is essential to remove the meat from the shell without delay to secure a good appearance and in order to avoid spoilage. The latter is brought

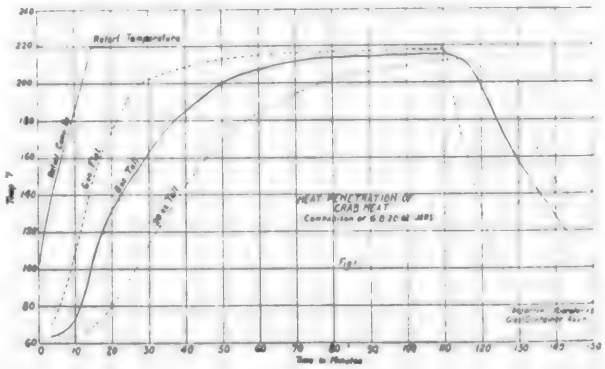


FIG. 1.

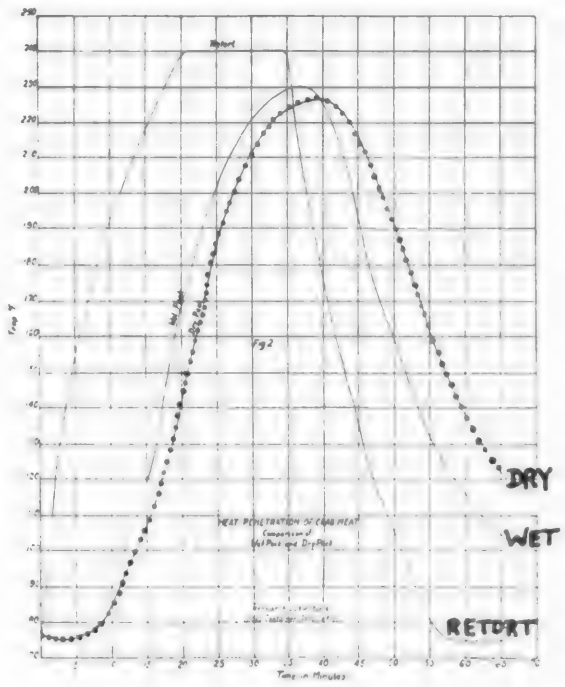


FIG. 2.

about by enzymes present in the crab. According to Fellers and Parks, no bacterial infection occurs until 20 to 36 hours after death, but after 10 hours disintegration of the muscle fibre occurs, accompanied by a grey to brown colour, soft texture, and a disagreeable, penetrating odour which soon renders the meat unfit for food.

In glass, crab meat can be packed dry or in a brine. In the former case the meat is washed, drained, and packed into jars without the addition of any liquid. The time of processing varies with the method of packing. In the dry pack the movement of heat is slow. Moreover, fresh crab meat is a neutral product, so that sterilisation requires relatively high temperature. The size of the container is another factor which influences the time of process.

A few methods will be mentioned to show how widely processing times and temperatures vary. A wet pack of a 5 to 10 per cent. brine containing 2½ to 3 per cent. acetic acid is processed at 240° F. for 20 minutes. Another method is to pack the meat in a straight brine without acid and process at 220° F. for 40 minutes. A method which may meet with success is the packing of crab meat in a very acid brine (*p*H 2·5 to 3·0) which might be termed a pickle. This meat is processed at 212° F. for 30 minutes, and is probably safe, since spoilage organisms cannot grow in such an acid product.

The acidity of the product will probably decrease somewhat after processing, due to the buffer action of the crab meat and to the formation of ammonia during storage. While these two factors would lower the acidity, it appears that it would be difficult to control the quality of the product because of changing rates of ammonia formation as well as a possible change in buffer action, the ability of a product to withstand the addition of acids or alkalines without changing its reaction, at different seasons of the year.

The purpose of the work carried out at the Glass Container Laboratory was to attempt to improve the appearance of crab meat packed in glass and to investigate the heat penetration in glass containers.

Several methods of packing were tried, with indifferent success. In general, methods in which an acid brine was used for washing the meat were far superior to those in which a straight brine was employed. The straight brine gave a product that was brown in colour and not marketable. While the first samples in which the acid wash was used possessed a fairly good appearance, a slightly grey discoloration, due to the condition of the meat used, was observed. One objectionable feature occurs in the dry packed crab meat. During the process the meat becomes compact and shrinks away from the jar, and, as there is no liquid to fill this space, the jar does not appear to be completely filled.

The following method gave an excellent product: The meat was treated with a more acid brine wash (2 per cent. brine, 3 per cent. citric acid) and instead of packing the product directly into the jars it was blanched for 5 minutes at 212° F. in the acid brine. The crab meat was then washed with cold water, drained, and packed into jars under a high vacuum, both dry and in the brine. Both of these packs gave a product in which the colour was unchanged, making an attractive package. The meat in these jars also became tightly packed during the process, but the tightness of pack would not be considered objectionable. A steam blanch did not give quite as good a colour as the method just mentioned, but an improvement over earlier methods. The advantage of the wet pack over the dry is simply one of appearance, for the space between the meat and the glass is filled with liquid and so obscures the shrinking of the meat.

Treatment of Meat.	*Packed.*	*Processed by*	*Temp. of Retort.*	*Time of Process.*	*Remarks.*
1. Washed with 2 per cent. brine.. ..	Dry	Steam	240	25 min.	Slightly brownish
2. 2 per cent. brine. 1 per cent. citric acid	Dry	Steam	240	25 ,,	Colour—fair
3. 1 per cent. brine, 1 per cent. citric acid	Dry	Steam	250	..	Colour—fair
4. 2 per cent. brine, 1 per cent. citric acid	Wet Wet 1 per cent. brine, 0·2 per cent. citric acid	Steam	250	30 ,,	Colour—very poor
5. 2 per cent. brine, 3 per cent. citric acid	Dry	Water	240	30 ,,	Colour — excellent
6. Blanched 5 minutes at 212° in the solution	Wet Same brine as used for washing	Water	240	30 ,,	Colour — excellent
7. Steam blanched ..	Wet	Water	240	30 ,,	Colour—fair

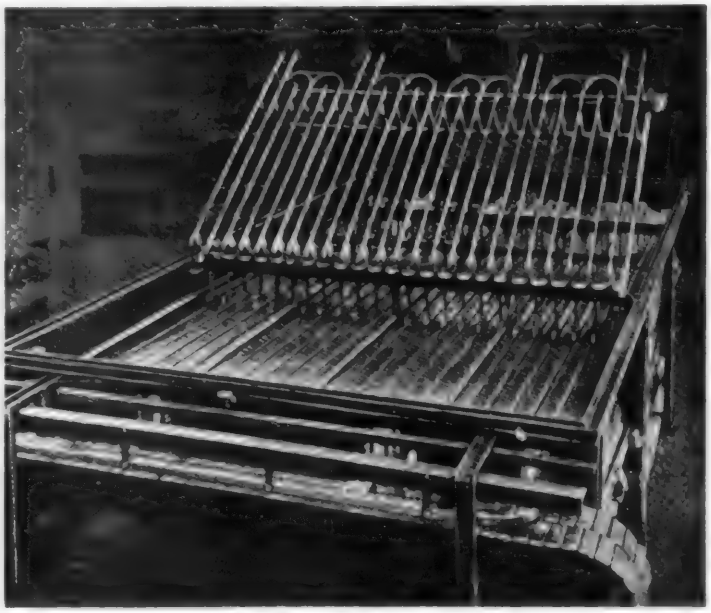
Heat penetration determinations have been made on crab meat with both steam and water cooks. Fig. 1 illustrates the difference in time required for the centre of jars of different size to reach the same temperature. It should be noted that even after the retort has been 220° F. for 1 hour 30 minutes, the 20-oz. jar has reached only 212°. It is doubtful if

(*Continued on page* 320.)

DEVELOPMENT OF VACUUM CAN CLOSING MACHINES

Joslyn and Mrak continue their article on the production of vacuum in canned foods from page 292.

ALTHOUGH EXHAUSTING by heat is generally satisfactory for canned foods which are to be preserved by heat sterilisation, it is not applicable to the production of vacuum in foods such as coffee, nuts, etc., which are marketed in cans. Furthermore, even the vertical exhaust boxes occupy sufficient space appreciably to increase the length of the canning lines, and in seasonal operation, where space in the cannery is at a premium, where high speed production with a minimum of investment in canning machinery which will stand idle for most of the year is necessary, such as in the salmon canning industry in Alaska, the use of steam exhaust boxes has not proved entirely desirable.* In addition, steam exhaust boxes are not desirable where the production of high vacuum in the closed container is essential. Under commercial operating conditions the practical limit of vacuum obtained by heat exhaust in 8-ounce cans is about 18 in. and is lower for larger cans. Vacuums of 8 to 18 in. have been found in sound commercial products.



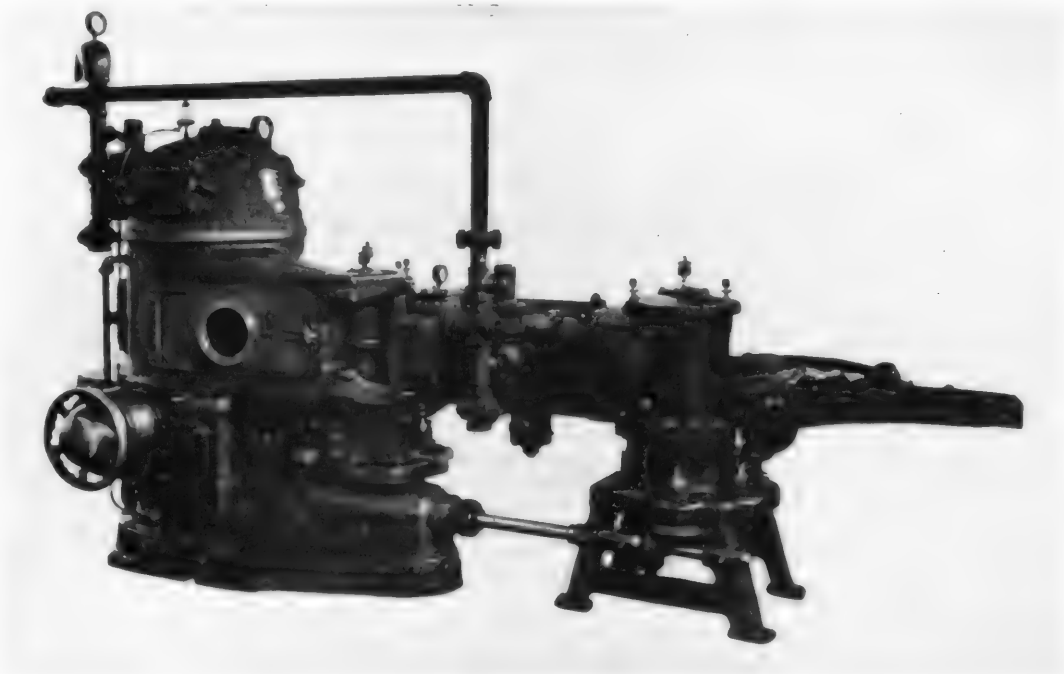
The Tucker Exhaust Box.

These limitations of the steam exhaust box have led to the development of the vacuum can closing machines. In exhausting by mechanical means, the filled can with lightly clinched cover passes into the chamber of the closing machines through a small door which closes hermetically. This chamber is connected with a large central tank in which a high vacuum is maintained by a separate pump. The lightly clinched can subjected to this high vacuum loses a portion of its enclosed air, and while the vacuum thus produced within the can is maintained, the cover is tightly rolled on and the can is discharged.

The vacuum produced will depend more on the nature of the product, its pretreatment, the length of time it is subjected to the vacuum prior to closing, and the degree of vacuum produced and held in the closing chamber, rather than on size or shape of can. Consequently, there will be less variation with cans of various sizes and shapes than is observed when exhausting by steam. However, the cans are generally sealed cold, so that where heat sterilisation is used the product should be cooked somewhat longer or at a higher temperature than when steam exhaust is used.

The first vacuum can closing machines operated at a fairly low speed and were not very efficient. However, machines of this type were used in the salmon canning industry over ten years ago, and one of the writers has seen one of the original machines operating in Florida on canned orange juice. The vacuum closing machines have been improved by making them more compact, more readily accessible for

* Steam exhaust has been found superior to the vacuum closing machines in removing certain objectionable odours from canned salmon, especially where the fish were allowed to lay around several hours, as sometimes occurs in salmon canneries. Although, if decomposition occurs, the resultant product is not improved by using an exhaust box there is at least no objectionable odour and the product may be rendered saleable under certain conditions.



Troyer-Fox Vacuum Double Seamer.

cleaning and repairing, and more efficient in producing a higher vacuum in a smaller time interval. The original valve principle for introducing the cans into and removing them from the inner high vacuum chamber has been retained.

High speed vacuum can closing machines of the Troyer-Fox type consist essentially of a central chamber containing the can seaming mechanism and a rotating valve, which has pockets carrying the cans from the air through a seal into the seaming chamber. A second valve of the same type is used to remove the cans from the chamber. Although these closing machines are normally operated at a speed of about sixty cans a minute, the Troyer-Fox Vacuum Double Seamers can evacuate and seal 120 cans per minute.

According to Rector* it is possible by the use of vacuum closing machines to exhaust cans of ground coffee under practical operating conditions to as low as 7·5 mm. absolute pressure or to remove 99 per cent. of the air from the cans. Since it was found impracticable to maintain a vacuum in the central chamber high enough to remove 99 per cent. of the air in the can by means of pumps connected to the central chamber, because of the large volume of air carried into the central chamber by the rotating valves, a new method was used by means of which this air was removed from the valves before it reached the central chamber.

Proper clinching of the lids on the cans prior to introduction into the sealing chamber, the use of a vacuum pump of sufficient capacity properly connected through a vacuum tank to the sealing chamber, and proper pre-evacuation before closing are essential in obtaining a high vacuum with the vacuum closing machines.

The use of these machines is increasing. They are employed not only in salmon canneries, but in other fish canneries, in vegetable canning for peas and corn, and in the canning of grapefruit, malt syrup, coffee, nut meats, etc. They are also applicable to the canning of fruits where the gases in the fruit tissues have been removed by soaking, as is the case in apples and rhubarb. Further development in the operation and construction of these machines is necessary before they are entirely satisfactory for exhausting canned fruits and vegetables in general, providing their substitution for the exhaust box is economically justifiable either on the basis of improved quality or decreased operating cost.

Acknowledgment.—Thanks are due to Mr. A. G. Caldwell of the Food Machinery Corporation for furnishing the photographs of exhaust boxes, and to Dr. William Harrison of the Continental Can Company for the photograph of the vacuum can closing machine.

* Rector, T. M., "Invention and Engineering Overcome High Vacuum Pack Problems," *Food Industries*, **3**, 328-329 (1931).

How I Help The Canning Industry

By A. L. MATTHISON

THIS IS not intended to be an exposition of personal pride or self-congratulation. It is a plain account of quite an everyday procedure, involving no particular ability, concentration, business aptitude, or technical knowledge. It can be emulated by the least experienced among my readers, as I trust it will. It demands very little effort or work, and costs practically nothing in hard cash.

The one thing it does demand, however, and the first essential successfully to carry on my plan, is faith—faith in the canning industry of this country.

I am appealing only to everyone connected either directly or indirectly with the canning industry; all the allied trades, including machinery, tinplate, packing, printing ink, lacquer, publicity, and many others.

I am not appealing to the outside public; that is primarily the canner's job; but I want to prove to everyone in the allied trades that he has a duty which it should be a pleasure and a privilege to perform.

Here, then, is an account of how I help the canning industry, which is so simple and so well within the power to emulate of everyone who reads this article, that there can be no excuse for his not doing so.

Faith in the canning industry involves first of all personal satisfaction with its products. This can speedily be secured by personal test in one's own household of any of the British brands of canned fruit, vegetables, fish, meat, or other foodstuffs. Such a test proves, beyond all doubt, firstly, that no foreign packed foods are better than their British equivalent; secondly, that as regards coloured fruits, peas, and many vegetables, no foreign equivalent is anything like as good as the British.

It therefore involves no sacrifice when I ask my readers to insist on British canned products in their households, as I do. I will not even use apricots or peaches; first, because they are foreign produce and, secondly, because, in my opinion, they cannot in any way compare with British damsons, raspberries, black currants, strawberries, plums, or loganberries for deliciousness of flavour and appetising qualities.

All visitors to my home are regaled with British canned fruits and vegetables, and the opportunity is never lost of extolling their merits. "What delicious damsons," is the criticism, "but they are not in season"—and straightway the empty can is brought in from the kitchen and a little discreet but effective propaganda follows.

So much for the home influence. Next I tackle the shopkeeper: "No, it is not just as good; if you haven't British I must go without!" The shopkeeper is a hard nut to crack, but persistency meets with its reward even here, and I've induced many to stock the British pack. Then propaganda among one's own workpeople, which I've found very effective. I ask my people to bring the empty cans from their homes, and woe betide anyone who brings a foreign one. Again, an opportunity for a little peaceful persuasive propaganda. It is sometime now since a foreign can has been brought to me; and many remark, "We never knew how good British canned fruit could be."

In restaurants, hotels, ships, and dining-cars I carry on the good work, following it up by letters to managers and proprietors, or by personal interviews. Too often I find foreign produce set before me. I often ask to be shown the tin; again an opportunity to help the canning industry.

In casual conversations in all places and at all times opportunities come, which to one who has faith in the canning industry should not be neglected. "I don't care for *canned* music," someone said to me at a cinema. "You mean *mechanical* music," I replied; "*canned* is a term of reproach in more senses than one, which cannot be applied to everything, canned fruit, for instance."

More propaganda and another convert.

I never allow that term "canned," when used in a derogatory sense, to pass without challenge. It is an insult which should not be taken lying down. The old prejudice dies hard, and my readers should ever be lying in wait to challenge it and to throw light into dark places.

Another effort in propaganda lies with the heads of the allied industries. Let them educate their own workpeople to support an industry on which a lot of their own prosperity depends. An occasional talk by one of the firm, the posting on the notice board of items concerning canning, the provision of British canned fruits at the annual works picnic or dinner, these are a few amongst many methods that should be employed to help the canning industry and ourselves.

There are hundreds of thousands of workpeople employed in the allied trades, each one a potential purchaser of British canned foodstuffs. It is a very substantial buying section of the public and one that is directly concerned with the success of the canning industry. It is my earnest hope that its active interest may be enlisted.

As I said at the beginning of this article, it is within the power of everyone who reads it to copy my methods of helping the canning industry. I do it constantly with little or no effort. I have outlined my procedure and claim no copyright. I think I have mentioned all the things I do. No, there is one other, I make lacquer.

National Food Canning Council

Sixth Annual Canners' Convention

Grand Hotel, Birmingham, October 25, 26, 27, and 28, 1932

PROGRAMME

TUESDAY, OCTOBER 25.

Evening from 9 p.m. in Grand Hotel: General Assembly in the convention lounge.

WEDNESDAY, OCTOBER 26.

Morning from 10 a.m.: Visits to the Canners' and Allied Trades' Exhibition, and to the Imperial Fruit Show, in the Bingley Hall, Birmingham.

Afternoon at 2.30 p.m. to 4.30 p.m.: Visit to Bournville by kind invitation of Messrs. Cadbury Bros., who will entertain the party to tea.

At 5.30 p.m. in the Grand Hotel: Conference on canning problems. (1) Pressures, vacua and head spaces in cans. (2) Problems affecting the export of canned fruits and vegetables to hot climates.

Evening in the Grand Hotel: Informal reunion of members in the convention lounge.

THURSDAY, OCTOBER 27.

Morning at 10 a.m. in the Grand Hotel: The Annual Meeting of the Council.

At 11 a.m. in the Grand Hotel: Conference with Growers. Subject: The Increasing Requirements of Canners for Supplies of Fruit and Vegetables.

Afternoon at 3 p.m. in the Grand Hotel: Conference with canned goods distributors (wholesale and retail).

Evening at 9 p.m. in the Grand Hotel: Reception by the Lord Mayor and Lady Mayoress of Birmingham.

At 9.30 p.m. in the Grand Hotel: Annual Convention Ball and Supper. (Evening Dress. Dancing to 2 a.m.)

FRIDAY, OCTOBER 28.

Morning at 10 a.m. to 11.30 a.m.: Visit to Messrs. A. Holden and Son, Ltd. (Lacquer, Enamel, and Varnish Factory), Bordesley Green Road, Birmingham (by kind invitation of the Directors).

12 noon: Special train leaves Birmingham for the Perry Wood Factory of the Metal Box Co , Ltd. Luncheon will be served on the train and a tour of the Works will follow the arrival of the train at the Perry Wood Sidings. (This trip is by kind invitation of the Directors of the Metal Box Co. Ltd.)

3 p.m.: Special train returns to Birmingham from Perry Wood Sidings.

Special facilities for rail tickets at single fare for the double journey, available from stations within 60 miles of Birmingham, or a single fare and one-third from any others, have been arranged.

The above arrangements are subject to modification.

REDUCED FARE VOUCHER

FORWARD JOURNEY

IMPERIAL FRUIT SHOW AND CANNERS' EXHIBITION BIRMINGHAM. OCTOBER 21st to OCTOBER 29th, 1932

To the
Booking Clerk.....Station.

.....Railway.

Please issue to the holder (whose signature appears on the other side) who is travelling to the above-mentioned Exhibition, a *.....Class single ticket to..... upon payment of the ordinary single fare (minimum 1s.) at the time of booking, and presentation of this voucher.

	To be stamped here with Station-name Stamp of original starting Station.
Stamp of Exhibition Authorities.	

INSTRUCTIONS.

Unless this portion is stamped by the Booking Clerk on the outward journey, and at the Office in the Exhibition for the return journey, the ordinary fare will be charged on the return journey, and no refund made in respect thereof.

This Voucher will be available for presentation on the outward journey on the **day before the opening** of, or on any day during the Exhibition, and the cheap ticket issued for the return journey will be available on any day during the Exhibition, and on the day following its closure, not counting Sunday.

Passengers must travel on the return journey by the same Company's route as on the outward journey.

*** Insert Class.**

RETURN JOURNEY

IMPERIAL FRUIT SHOW AND CANNERS' EXHIBITION BIRMINGHAM. OCTOBER 21st to OCTOBER 29th, 1932

To the
Booking Clerk.....Station.

.....Railway.

Please issue to the undersigned a *.....Class Single Ticket to †.....**on surrender at the time of booking of this portion of Voucher** duly stamped by the Exhibition Authorities and payment of one-third of the ordinary single fare (fractions of 3d. reckoned as 3d.).

No. of Ticket issued and Fare.
(To be filled in by Booking Clerk.)

No.	*Fare*

INSTRUCTIONS.

Unless this portion is stamped by the Booking Clerk on the outward journey, and at the Office in the Exhibition for the return journey, the ordinary fare will be charged on the return journey, and no refund made in respect thereof.

This Voucher will be available for presentation on the outward journey on the **day before the opening** of, or on any day during the Exhibition, and the cheap ticket issued for the return journey will be available on any day during the Exhibition and on the day following its closure, not counting Sunday.

Passengers must travel on the return journey by the same Company's route as on the outward journey.

*** Insert Class.**

† Insert here the name of the original Starting Station.

Signature of holder.....

(To be signed before forward journey is commenced.

THIS PORTION OF VOUCHER TO BE SURRENDERED TO THE BOOKING CLERK AT THE TIME OF BOOKING FOR THE RETURN JOURNEY.

In order to obtain the return ticket at one-third the single fare this voucher must be stamped at the Secretary's Office, Exhibition Hall, Birmingham.

Yeast Extracts

DURING the last thirty years extracts of yeast have gradually increased in popularity as articles of diet, as substitutes for meat extract, or for use in pharmacy.

The underlying principles of the manufacture of both yeast and meat extracts are very similar, and just as there are many grades of meat extract, so there are many varieties of yeast extract. The most important step in their manufacture is the removal of the bitter principle, and numerous patents have been taken out with this object in view. After this there is little difficulty in obtaining a preparation which is very similar to meat extract in taste, odour, and appearance. The yeast is first screened and washed in order to remove any foreign matter and liquor in which it has been grown. The amount of extraneous matter will, of course, depend largely on whether beer yeast, spirit yeast, or special culture yeast is being employed, and the initial bitterness will be affected also by these factors; beer yeast is usually dirtier and more bitter than that from other sources. It is usual to de-bitter at this stage, and for this purpose treatment with dilute alkalis, acetic acid, or oxidising agents has been recommended. Acetic acid has the advantage that it has no action on the vitamin content of the yeast; at the same time, alkali appears to be more effective and rapid than acid in removing the bitterness.

The next stage consists in extracting the liquid portion from within the cells. This may be accomplished by alternate freezing and thawing, by autolysis of the yeast, or by rupturing the cell wall by live steam with or without the addition of salt. Commercially, the last two methods appear to be the most used. Autolysis may be carried out at about 30° C., but it is general to employ a higher temperature, ranging from 40° to 50° C. Pressed yeast will undergo autolysis at 30 C°., but its optimum temperature lies between 49° and 50° C., and at this temperature the whole of the glycogen disappears in from three to five hours, though some days are required to complete the autolysis for the preparation of an extract. Extracts made by the autolysis method are usually slightly darker in colour than those prepared by live steam, but, on the other hand, steam extraction coagulates the protein and cell walls in one stage, whereas with autolysis these have to be coagulated by steam afterwards. After clarification the juice is concentrated, at first in open pans, during which time the colour and odour develop, and finally *in vacuo*, care being taken not to develop a bitter taste. In one patent, instead of de-bittering the original yeast, the extract is evaporated to half bulk, and hydrogen peroxide (about 5 per cent.) is added, after which the liquor is boiled and clarified.

Meat extracts are richer in fat than yeast extracts, the former usually containing from 6 to 8 per cent., while the latter contain only about 1 per cent. As mentioned above, the colour and flavour depend largely on the details of manufacture, but the chief difference between meat and yeast extracts consists in the presence of creatine (about 2 to 5 per cent.) and creatinine (about 3 per cent.) in meat extracts, while yeast extracts are entirely free of these constituents. Considerable discussion continues to take place as to the value of these extracts as articles of diet, but there can be no doubt as to their value as stimulants, and there appears to be little to choose between meat and yeast extracts in this

Yeast is a valuable source of vitamin B, and when extracts have been properly prepared most of this may be retained in the extract, so that yeast extract can be used for its vitamin content. Yeast extract is also official in the German Pharmacopœia for the manufacture of pill masses, in which it is used as a plasticiser.

New Pineapple Cannery

A FACTORY designed for an output of 50,000 cases (each of 2 dozen No. 2½ cans) of pineapple a year has recently been erected in British Guiana, and has been equipped with plant built in England. A high-quality pack will be turned out. It is interesting to note that the smooth Cayenne pineapple usually canned in Hawaii originally came from British Guiana.

After a preliminary grading, the pineapples pass through a sizer and corer, then on to the trimming tables and through a slicing machine. After being filled on the packing table with slices, the cans pass under the syruping machine and thence through the exhauster. The latter is fitted with brass guides and steam pipes. The cans are double-seamed by a Rhodes' Troyer-Fox machine, and then pass through a single discharge cooker with galvanised reel and spirals. Finally, the cans are conveyed through the cooler.

We are informed that the layout of the factory was designed by Messrs. Westgate, Ltd., who also acted as consultants to the scheme. The canning plant was supplied by Food Machinery (M. and P.) Ltd., the flat cans by the Metal Box Co., Ltd., the reformers by Rhodes and Sons, Ltd., the labelling machines by Beth Label and Wrapping Machines, Ltd., the boilers by Marshall, Sons and Co., Ltd., and the factory was erected by A. and J. Mains.

In addition, the factory is equipped with a vinegar making plant and syrup pans (by Messrs. Brierley, Collier and Hartley, Ltd.), and also a pineapple grater for making pineapple crush for confectionery purposes, thus making profitable use of the waste material.

Let's Start a Can Shop

WHEN Charles Almy, jnr., Vice-President of Dewey and Almy Chemical Company, the manufacturers of the Gold Seal Cap Compounds, went on a world tour he found canners making "sanitary" cans out of second-hand petrol tins. Everywhere (except in England) he found the canning industry "tremendously handicapped by the lack of what every canner in this country takes for granted—viz., centralised can manufacture in strong, capable hands." "It would seem to be more than a coincidence that the great strides made recently by the canning industry in England came simultaneously with equally great strides in centralised can manufacture."

Mr. Almy proceeds to discuss (*The Canner*, September 10, 1932) the functions and responsibilities assumed by can manufacturers, and then asks whether a canner with an outside supply of good cans readily available will actually save any money by making his own, assuming that it might be possible for him to make them of a satisfactory quality. In this connection Mr. Almy points out certain factors to be taken into consideration, such as costs of layout and operation, carrying charges, and storage problems.

The subject which Mr. Almy has raised is a very important one for canners, and although the idea of "starting a can shop" is attractive at first sight, it should not be undertaken without careful consideration of the pros and cons.

Progress in Fruit Bottling

IT is a curious fact that in spite of the enormous amount of engineering brains that has been focussed on canning plant and machinery in order to evolve the speediest and most efficient canning line possible, the bottling line has received little or no attention in this respect—until quite recently. The credit falls to Mr. T. C. Sutcliffe, of Sutax, Ltd., and from him we obtained the following interesting information.

The method in common use of standing loosely capped bottles of fruit in a tank of water at about 180° F. for 1½ hours and then slowly cooling by standing them on the floor (perhaps for 12 hours), removing the spring clips, and stacking, is obviously hopelessly out of date and inefficient in principle. Realising this, Mr. Sutcliffe happened to be discussing with a firm of jam manufacturers the ways and means of speeding-up fruit bottling, when the point was raised as to why the jars should not be put straight into hot water instead of slowly bringing them up to the sterilising temperature. This appeared at first sight to be imposing a dangerously severe strain on the glass, but against this there is the fact that jam is usually filled at high temperatures into glass jars without cracking taking place. With this in mind, Mr. Sutcliffe had preliminary experiments carried out in order to obtain more definite information as to the resistance of glass jars to sudden temperature changes. In these experiments jars filled with cold water were immersed in hot water at varying temperatures. As an outcome of this, the work was put into the hands of a research station with the suggestion that instead of filling the jars with cold water after the fruit has been put in, they should be filled with water at 190° F. By this means, not only was the glass jar tempered preliminary to its immersion in the exhaust box at 190° F., but it also enabled a reduction to be made in the time required for the heat exhaust.

Based on the data obtained from experimenting on the above lines, a continuous automatic bottling line has been developed. The general method of operation is as follows:

The glass jars are filled with fruit, followed by hot water or syrup. The jars, without caps, are passed into a disc type of heat exhaust box, specially adapted for the purpose. Emerging from the box, the jars pass under the capping machine, and thence through a processing tank, where the jars are completely sterilised. We understand that a cooling unit is being incorporated in the line.

Such a plant, it is stated, is able to deal with 1-lb. jars at the rate of 30 a minute, without breakage or loss, and the capacity can be increased to any required output.

Mr. Sutcliffe adds that his pleasure at the successful outcome of this research is increased since, he says, it removes one of the few drawbacks to the use of glass for preserve packing, which is preferred by many consumers on the grounds of hygiene, the visibility of contents, the "reusability" of the container, and the fact that a tin-opener is not required.

A New Cooler

QUITE recently we had the privilege of seeing a new system for cooling bottled fruit at work in a large food factory. The cooler has been designed and installed by the L.C. Engineering Co., Ltd.

It is rather strange that no one appears to have previously made any serious attempt to find a way of reducing the time required for cooling and, incidentally, of making more profitable use of valuable factory floor space. A 12-hours' cooling period is clearly a relic of old-fashioned, slip-shod days, when space and labour were relatively cheap and time was of no particular consequence. The amount of handling, confusion, and annoyance that Nature's cooling methods involved is a tribute to the patience and solid conservation of many of our food manufacturing concerns.

The essential feature of the L.C. process is cooling by air currents in which, at suitable points, water has been sprayed in a finely divided state. The bottles, after receiving their heat-exhaust treatment in the tanks, are placed on a metal conveyor, each bottle being held in an upright position in a framework attached to the conveyor. The conveyor moves between two rows of exhaust boxes so as to facilitate loading. The bottles are moved through a tunnel, about 2 feet 6 inches by 1 foot in cross-section and 90 feet in length. Arranged at suitable points along this tunnel are fans and water sprays, and by means of suitably disposed baffles the air is circulated over the bottles in such a way as to effect their uniform cooling at a predetermined rate. Arriving at the exit end of the tunnel, after a period of about 20 minutes from the time of loading, the bottles are lifted from the conveyor, the spring clips removed, and now that they are completely cooled are ready for stacking.

TRADE NOTES

Filling Machines.

The attention of those interested in bottle filling machines for sauces, oils, creams, etc., is directed to a series manufactured by the Roberts Patent Filling Machine Co. Gravity, pressure, and vacuum types are available. The machines are simple in construction, and a high rate of performance is attainable. A large number of types are made to suit special requirements. Thick liquids can be filled rapidly from raised tanks. They are easy to operate and to clean. Both thick and thin liquids can be dealt with.

* * *

Fruits of the Empire at Birmingham.

An old English market-place, with half-timbered walls and tiled roof, is to house the Empire Marketing Board's display at the Imperial Fruit Show which is being held this year in the Bingley Hall, Birmingham, and opens on October 21. The exhibit will cover 10,000 square feet of space.

All the fruit-producing countries of the Empire are taking part in the exhibition. They include England and Wales, Northern Ireland, Canada, Australia, New Zealand, South Africa, the Irish Free State, Southern Rhodesia, Malaya, Cyprus, and Trinidad and Tobago.

Fruit growing the Empire Marketing Board regards as one of the Empire's most promising industries and one which it is therefore helping by every means in its power to develop. From the United Kingdom down to the smallest Colony there is hardly an Empire country that does not grow fruit in variety and abundance for the home market. That is one of the reasons why fruit is no longer a luxury nor even only plentiful at certain seasons of the year.

The Empire Marketing Board's exhibit at the Imperial Fruit Show will provide, for the inspection of the trade and of the public, a comprehensive display of the fruits available from the Empire at home and overseas, and show just how fine in quality and how plentiful in variety are the resources now at our command. The main feature of the England and Wales stand will be a display of dessert and culinary varieties of home-grown apples and pears, designed to show not only the excellence of the fruit, but the method of packing under the National Mark Scheme. The display will also include commodities manufactured entirely from home-grown fruit—viz., canned fruits, bottled fruits, tomato chutney, jams, and cider, as well as English glasshouse produce and honey.

Samples of the manufactured articles will be on sale.

Soyolk Bread.

An interesting report on analyses of bread containing 20 per cent. Soyolk was recently prepared by an authority, which shows a striking increase in food value of this bread over ordinary bread. The protein is increased by half as much again, the fat is increased nearly fourfold, the lipoid (lecithin or similar compound) is increased from a negligible quantity to over ½ per cent. The following details are given:

Weight of loaf, 1 lb. 14 oz.; colour of crust, golden brown to chocolate brown; colour of crumb, pale cake yellow; its feel was moist (although two days old) and springy; texture similar to well-made Hovis bread.

The bread when examined contained 48·36 per cent. moisture. A microscopic examination of the crumb in the centre of the loaf shows it to contain considerably less whole unburst—*i.e.*, uncooked—starch granules than is usual with white bread.

This is probably due to the fact that more water is required in making this bread than in the case of white bread, thus facilitating the cooking of the starch.

The yellow colour from the addition of Soyolk is almost entirely due to carotinoid pigments in the Soyolk oil, as when the oil is extracted from Soyolk the residue is almost white. As it has been recently proved that these pigments are intimately related to vitamins or to the capability of the human system to form vitamins, this colour would appear to be an advantage from a dietetic point of view, and, probably, if these pigments were destroyed by bleaching, it would be to the prejudice of the food value of the product.

	Wheaten Flour.	Soyolk.	Bread.
Protein	13·13	47·86	20·83
Fat (acid hydrolysis method) ...	1·65	23·32	6·05
Crude fibre ...	0·22	2·13	0·61
Ash (mineral salts)	0·48	5·57	2·20
Salt	—	—	0·75
Lime	0·02	0·08	0·03
Total phosphoric acid (P_2O_5) ...	0·22	1·73	0·53
Lecithin Phosphoric acid ...	0·007	0·22	0·05
Lecithin equivalent	0·08	2·42	0·55
Starch	80·60	under 1 %	64·20
Soluble carbohydrates	3·75	16·40	6·50

The M.O.H. Annual Report.

A satisfactory feature of the thirteenth annual report of the Ministry of Health for 1931-32 is the statement that out of the 136,169 samples of foods and drugs submitted to public analysts for examination, only 4·6 per cent., or 6,324 samples, were found not up to standard or adulterated. This is the lowest percentage yet recorded. To refer to particular cases, 92 of the 1,621 samples of jam and marmalade analysed were adversely reported upon. Fifty-eight contained excess sulphur dioxide, and others were deficient in soluble solids, or were regarded as not complying with the description on the label owing to the addition of juices from fruit of a different sort from that specified. One sample contained fibrous material, string, and packing. In one sample of strawberry jam it was found that only one-quarter of the fruit used was strawberries, and in another instance raspberry jam was reported to contain 21 per cent. of apple and 1 per cent. of gingelli seeds. In the latter case the wholesalers were fined £10 and £10 10s. costs.

* * *

Miscellaneous Foods.

Twenty-eight samples sold as "bread and butter" were bread and margarine. In one case the vendor was fined £4 and £1 1s. costs. In 10 samples of cream buns, cream cakes, and cream doughnuts, the "cream" was wholly or partly vegetable fat. Nine samples of sausages were reported to be deficient in meat, 27 samples of potted meat were reported to contain excess water, and 18 starchy material, and a sample of steak and kidney pie contained no kidney. Several samples of ice-cream were reported to contain no milk fat other than that derived from condensed milk, while a sample labelled "extra cream ice" contained only 2 per cent. of fat. Seven samples were reported to consist of milk sweetened, thickened, and flavoured without the addition of cream, and the analyst expressed the opinion that such preparations should be described simply as ices, the term "ice-cream" being misleading. Sand was reported in 32 samples of mixed spice, cinnamon, chicory, and mixed herbs, and in some cases the vendors were successfully prosecuted. The vendor of a sample of cinnamon containing 12·7 per cent. of silicious matter was fined £5 and £5 5s. costs.

* * *

The British Aluminium Co., Ltd., Adelaide House, King William Street, London, E.C. 4, announce that the telephone number of their new London warehouse at 23-25, Pancras Road, N.W. 1 is "North 5301" (two lines).

Automatic Temperature Control.

Details of their V.T. automatic temperature regulator are given in some leaflets issued by the Drayton Regulator and Instrument Co., Ltd. The regulator, which is available in various forms, consists essentially of a thermo-sensitive bulb which requires to be exposed to the temperature of the liquid or gas under control, and a valve which is installed in such a position that its operation will vary the flow of heating or cooling medium. Trapped vapour, formed by the heating of a volatile liquid contained in the bulb, exerts a pressure which exactly corresponds to the temperature surrounding the bulb. The pressure is transmitted through the connecting tube to a bellows housed in a casing above the valve, and so arranged that movement of the bellows is opposed by a spring or weight. As the temperature for which the regulator is set is approached, the pressure generated by the volatile liquid becomes sufficient to expand the bellows against the resistance of the spring or weight, so gradually operating the valve. With falling temperatures the pressure decreases, so allowing the valve to move in the opposite direction. Where cooling mediums are controlled, a reverse acting valve is used. The regulator is used in a variety of industries, including soap boiling, impregnating and wax coating tanks, pasteurisers, drying cabinets, and kindred use.

* * *

Draught and Pressure Gauges.

Cambridge draught and pressure gauges are described in list No. 152A, issued by the Cambridge Instrument Co., Ltd. The accurate determination of pressures and vacua is an essential feature of many modern industrial processes, and such measurements frequently have to be made under severe conditions of service. It is necessary, therefore, that the instruments employed should be so designed that they retain their full sensitivity under the most unfavourable circumstances. The draught and pressure gauges described in the leaflet referred to are claimed to combine robustness and precision in a remarkable degree and have proved their reliability in many fields of usefulness. They are made in both indicating and recording patterns, the former being supplied in various ranges up to 60 inches of water, while the latter cover measurements up to 2,000 lb. per sq. inch.

Power plant applications, however, although important, do not exhaust the numerous directions in which the instruments described can be employed. In addition to being installed in many power stations, Cambridge gauges, in both indicating and recording patterns, have been supplied in large numbers to practically every branch of industry, and are installed in iron and steel, engine, electric cable, and gas works; foundries; chemical factories; glass, cement, brick, and lime burning works; dye, colour, and bleaching works; printing and paper works; vulcanite factories, salt works; oil refineries; breweries, saccharine factories, confectionery works, flour mills, and dairies; wool spinning mills; calico printing works; tanneries; heating and ventilating systems; etc.

* * *

As a stimulus to Empire fruit sales, 1,000 apples, 7,500 oranges, 7,000 cartons of dried fruit, and 2,000 samples of canned fruit are to be given away among visitors to the Twelfth Annual Imperial Fruit Show which opens at the Bingley Hall, Birmingham, on Friday, October 21.

IMPORTANT ARTICLES

will be published in the next issues of FOOD MANUFACTURE on **Canning** and **Preserving,** including the Preparation of **Citrus Juices,** the Manufacture of **Pickles,** the Preparation of **Olives, Dried & Crystallised Fruits,** and **Marmalade.**

Other Articles ready for publication are :

The Manufacture of Flavouring Essences.
Fondants and Creams.
Liquorice Goods.
Mould Spoilage.
Tinfoil Blackening.

Importation of Essences.

The *Board of Trade Journal* has directed the attention of U.K. exporters to the fact that the importation into and use in Jamaica of certain essences is restricted by a proclamation and order-in-council dated January, 1931. The prohibition applies to oil of gin, oil of cognac, essence of brandy, essence of whisky, and similar flavouring substances which can be used in the preparation of alcoholic liquor or mixed therewith "except they be of a brand to be approved by the Governor in Privy Council." It is understood, however, that this approval is given if the importation is accompanied by a certificate from a competent public authority in the country of origin to the effect that these substances contain nothing injurious to health.

* * *

Margarine Manufacture.

We recently had a conversation with Mr. P. R. Hugenholtz, who represents the Palsgaard Emulsion Oil (P.E.O.) in this country, invented by Mr. Einar Schou. P.E.O. is an oil soluble in oil, and is used as an emulsifier and stabiliser in connection with the manufacture of margarine, which, as we now know, is a water-in-oil emulsion. Mr. Hugenholtz gave the following advice with regard to the newer way of making margarine :

For churning 1 ton of margarine 10 lb. of P.E.O. is added, after having been thoroughly dissolved in and mixed with the fat having the highest melting-point.

After completely dissolving the P.E.O. in a small proportion of the fats and then adding this to the bulk, it is placed in the blender. The temperature must be so high that the bulk of the fat is bright and clear so that the melted fats do not commence to crystallise. During the process of emulsification the wings in the blender must be running at full speed—namely, about 23 feet per second. This is, for a wing with a diameter of 39 inches, 130 revs., and for a wing with a diameter of 2 feet 8 inches, 160 revs. per minute.

After the fats have been poured into the churn, the milk and water is added slowly—*i.e.*, ten minutes must be allowed for the full quantity of milk or water (20 per cent.) to run into the churn. Colouring, etc., is then added, and after two to three minutes the margarine emulsion is ready for the cooling process. The milk and water must have a temperature of not more than 4° C. The whole process of blending from the time the fats enter the churn should take twelve to fourteen minutes.

Crushed ice or iced water for cooling the margarine emulsion is superfluous and, furthermore, very unsatisfactory.

The temperature at which the margarine emulsion is run out from the churn for cooling must be so high that the emulsion still remains liquid. The blending must on no account continue so long that the margarine emulsion appears thick and grainy, as this shows that the melted fats are on the point of crystallising. Further, too much air would then enter into and thus disturb the emulsion, and, in addition, it is not possible to obtain a fine division of the small milk or water globules when a portion of the fats already have commenced to crystallise.

The further treatment can now be carried on in the usual manner, but it is advisable to exercise care to add, from the commencement, milk or water sufficient to obtain the necessary water contents. Water added after emulsification is no longer binding and remains as free water in large drops in the margarine. The large water drops cause (1) sputters when frying, (2) they form a new source for bacteria infection, and (3) they mean unavoidable sweating.

* * *

Argentine Grapes.

The monthly review of the Bank of London and South America, Ltd., reports the formation of a company in the Argentine province of Mendoza to organise the production and sale of fruit, especially grapes, for the European and American markets. A new cold storage plant is to be constructed, with the co-operation of the Buenos Aires and Pacific Railway Co., to handle 400,000 boxes.

INFORMATION and ADVICE

SMOKED HADDOCK—PECTIN MANUFACTURE—WINES—FAT CLARIFICATION — LIQUORICE CONFECTIONS — VINEGAR LABEL — SELF-RAISING FLOUR — LEMON CURD — CANNED SHRIMPS — MINCEMEAT — ROYAL APPOINTMENT — YEAST EXTRACT—POTATO CRISP—PORK SAUSAGE—GLACÉ CHERRIES —BRINING OLIVES—JERUSALEM ARTICHOKES—CASINGS—ONION BLACKENING

Smoked Haddock.

844. *Kindly give us some information on the preparation of haddocks.* (France.)

This is a big subject and cannot be answered properly here, but the following notes may be of some assistance.

To make a good product requires experience, as well as much care and attention, especially in the pickling and smoking. When received at the curing-house the fish have usually been split down the belly to the vent and eviscerated, as if prepared for the fresh-fish market. They are first beheaded and washed thoroughly with a stiff brush, all the black membrane lining the abdominal cavity being removed. They are next split down to the tail and a cut made along the right side of the backbone so that they will lie out flat, and the rough edges of the backbone are removed. They are then immersed in strong salt brine for one or two hours, according to the weather, temperature, size and condition of the fish, and the particular flavour desired, the exact length of time for pickling being ascertained by experience.

On removal from the brine they are fastened to sticks, from which they are suspended in the smoke-house, the napes being stretched out flat and pierced by two small iron spikes or nails fixed in the smoke-sticks. These sticks are about 1¼ or 2 inches square and 4 feet long, three fish being usually hung from each. The sticks with the fish attached are placed on frames for a few hours to allow the moisture to dry from the fish, when they are suspended in the smoke-house, which is generally like those used in smoking herring, the sticks being placed in tiers, one above the other, with space between to allow the smoke to circulate. A fire of hard wood, usually oak, is started over the floor of the smoking kiln and allowed to burn from eight to eighteen hours, when sawdust is applied, smouldering the fire and producing a dense smoke, which thoroughly impregnates the fish. In smoke-houses with a low ceiling the smoking can be completed in four or five hours. In some smoke-houses no wood is used, the curing being effected by burning hard-wood sawdust, and the temperature is kept as high as practicable without burning the fish, which are placed high up in the bays. The time of cooking or smoking depends on the condition of the fish, temperature of the air, and the probable time to elapse before consumption, but never exceeds one night.

When the smoking is completed the fish are removed from the smoke-house and placed on racks for cooling. When thoroughly cooled they are packed in boxes. Only enough are cured at a time to supply the immediate demand, as it is important that they reach the retail dealers in good condition. During warm weather they will keep only a few days, but when the weather is cool they will, under ordinary conditions, keep from ten days to two or three weeks. If it is desirable to keep them longer they must be smoked more thoroughly.

845. *Would you please put us in touch with the actual manufacturers or big importers of wafer rice paper?* (Gloucester.)

This was done.

846. *I will be much obliged if you can supply me with recipes for the manufacture of chicken and ham rolls in tins.* (London.)

Assistance was given.

847. *We should be grateful if you could put us in touch with manufacturers of dried fruits.* (Birmingham.)

This was done.

848. *We want a machine for reducing in size the solid particles held in suspension in a liquid.* (Yorks.)

Suggestions were made.

849. *Required makers of machines for peeling pickling onions.* (Wales.)

Names of firms given.

850. *Please refer us to firms able to supply maize starch.* (London.)

This was done.

851. *We wish to obtain supplies of dried and powdered preparations of those bacteria responsible for the souring of milk.* (Mddx.)

Suggestions were made.

Pectin Manufacture.

852. *We are anxious to obtain any particulars which are available on the subject of the efficient extraction of pectin from pomace.* (Midlands.)

We gave an account of this subject in the May issue.

853. *We notice from the several enquiries on pages 246, 247, and 248 of the August number of your paper that firms are interested in an onion peeling machine. We should also like to know the names of anyone making this machine in England.* (London.)

Information supplied.

854. *I have come across a copy of your magazine dated October, 1931, and on page 293, dealing with the Bakers' Exhibition, and the last paragraph headed "Moisture Testing in Flour," you mention "there is a method of moisture determination depending on a dielectric or capacity principle."*

You also state that "there are several machines now available on this principle."

I shall be much obliged if you will inform me from whom these machines can be obtained. (London.)

Information supplied.

855. *Can you please give us the names of manufacturers of wood trays and backets for fruit?* (London.)

Names supplied.

856. *On page 3 of* FOOD MANUFACTURE *for January, 1932, there is mention of a paper read by Korfhage and Schuette at the 1930 meeting of the American Chemical Society on the moisture-absorbing tendencies of sucrose, lævulose, maltose, commercial invert sugar, and commercial corn syrup at varying humidities and at a constant temperature of 77° F.*

Will you kindly let me know where the original paper was published, and at the same time state if a copy can be obtained in this country? (Yorks.)

It is usual for the American Chemical Society to publish the most important papers in *Ind. and Eng. Chem.*, but we do not remember having seen the one to which you refer. The best thing is to write to the secretary of the American Chemical Society.

857. *Will you please give us the name of the agent for Frisco Machine Skimmed Milk?* (Lancs.)

We do not know. Probably a reader will help.

858. *We are considering the question of taking up the manufacture of meat cubes and should be glad to have any information or recipes.* (Lancs.)

This is too big a subject to handle by correspondence. We are having an article prepared for future publication.

Wines.

859. *Dr. Tibbles in his book "Foods" (page 910) says that home-made raisin wine contains about 18 to 25 per cent. of alcohol by volume. Does it mean that there are no Excise restrictions on home-made wines, although they contain so much alcohol? What are the restrictions, please?* (India.)

Excise is only concerned with the trafficking in dutiable articles. There is no restriction on the consumption of home-made wines, no matter what their alcohol content may be, provided they are not traded. Home-made wines may not be sold or even given away; they are purely for personal home consumption. The fact that a dealer labels a wine "home-made" does not exempt him from duty. If exposed for sale the product is liable to the usual excise rates. The regulation, however, may be different in Bombay.

860. *Kindly inform us where we can obtain a printing machine, press or stenciller for the printing of our name and products on the wooden boards we use for making our packing-cases.* (Wales.)

Name of firm was given.

861. *Please give name of makers of bins to hold 2 cwt of sugar, with lids attached.* (Lancs.)

Names were supplied.

862. *Please furnish name of manufacturer of small spray painting and/or whitewashing apparatus.* (London.)

This was done.

863. *Is there a book published dealing with the manufacture of jam?* (Midlands.)

No. See back numbers of FOOD MANUFACTURE.

Fat Clarification.

864. *I am looking for a small plant to clarify soft fat, capacity from 2 to 3 cwt. Can you put me in touch with anyone making such a machine?* (Scotland.)

It is a little difficult to state precisely what would be necessary without knowing the condition of the fat and the origin thereof, and without being informed as to the product which is aimed at. Clarification is a term which might imply anything. It might amount to the removal of suspended matter or treatment with bone charcoal or fuller's earth. It might further involve the removal of free fatty acid, coupled with deodorising. As a rule, small fat makers have only very vague ideas as to what is called for. Their attitude generally is that they want to improve their product.

The enquirer was put in touch with a firm of specialist engineers who would give their advice after consideration of all the factors involved.

865. *Kindly inform us as to the suppliers of cartons.* (London.)

This was done.

866. *We are anxious to get into communication with manufacturers in this country of automatic tube-filling and closing machines.*

The machines we have in mind must be suitable for filling tubes with dyes, greases, pastes, creams, table luxuries (mayonnaise, beef extracts, etc.), foamy substances (shaving creams, refined creams), for filling tin boxes with liquids (liquid cheeses, gelatines, etc.). We shall therefore be glad if you will kindly furnish us with the names and addresses of such manufacturers. (London.)

This was done.

867. *Kindly supply list of latest works of a general nature on vitamins.* (Ireland.)

A list was supplied.

Liquorice Confections.

868. *We are interested in the manufacture of a line of "penny" style liquorice, using oil of aniseed as a flavour. This confection is usually put out in the form of whips or pipes and is sold to children.* (Canada.)

We have prepared an article on this subject, and it will be published as soon as space is available.

869. *We want a second-hand steam-jacketed boiler. Can you give us the name of a likely supplier?* (London.)

This was done.

Vinegar Label.

870. *Will you please inform me if we should be right in using the enclosed label on bottled table vinegar? It is not pure malt.* (Kent.)

We cannot, of course, express any definite opinion on the matter you raise. It would, however, seem, without committing ourselves in any way, that the present label is satisfactory provided that the supplementary label is "Table Vinegar," with no reference to the word "pure" in connection with the actual wording of the description of the vinegar. If no supplementary label is employed it would appear that you are liable to be jumped on, especially in view of a recent case in the North.

You do not state what your product is, whether it is a blend of malt vinegar with artificial vinegar or if it is artificial vinegar entirely.

871. *Please supply names of firms making machines for peeling pickled onions.* (Lancs.)

This was done.

872. *With reference to the article on "Small Scale Margarine Manufacture" in your September issue. The writer remarks that there being several types of high-speed emulsifiers on the market. We shall be glad if you could furnish us with the names of manufacturers.* (Scotland.)

Names were supplied.

873. *With reference to Tinesol, mentioned in your last issue, we shall be glad to know if you can put us into touch with the suppliers?* (Liverpool.)

This was done.

Self-Raising Flour.

874. *We have read with interest your article in the last issue of* FOOD MANUFACTURE *relative to self-raising flour in the U.S.A.*

We think, however, that this article is liable to be misleading to the average manufacturer of this commodity in this country, in view of the fact that the acid constituent is given as acid calcium phosphate.

While this material in the hand of the larger manufacturers properly equipped with technical information is, of course, a suitable ingredient, the climatic conditions obtaining here are such that we feel sure that acid sodium pyrophosphate is the better article, particularly in view of this chemical's greater chemical stability in the presence of atmospheric moisture. (Lancs.)

The Editorial referred to specifically stated S.R. Flour in U.S.A., and was not intended to deal with conditions in this country. In U.S.A. the chief ingredient used is acid calcium phosphate. Acid calcium phosphate is quite stable in this country and is undoubtedly used more than any other raising ingredient.

It is the opinion of some that the objection to acid sodium pyrophosphate is the brackish taste imparted to the cooked goods.

875. *Kindly give us names of firms handling beef and lard stearines.* (Yorks.)

This was done.

876. *We are thinking of packing baking powder in aluminium containers. Is there likely to be any detrimental action?* (Yorks.)

We would prefer to use other materials for the containers, or, at any rate, to use liners.

The enquirer was referred to the aluminium producing companies for their views.

877. *I should be obliged if you would recommend a good book on the manufacture and packing of potted meats.* (Birmingham.)

There is no such book. The enquirer was referred to articles we have published.

Lemon Curd.

878. *How can we avoid mould on lemon curd? (The enquirer gave the ingredients and methods he is using.)* (Yorks.)

We have dealt with this subject previously. Every precaution to avoid contamination should be observed. Citric acid should not be used as it will produce mould. Instead it is recommended to use acetic acid, which is a preservative. If mould is troublesome the jar should be wiped with a glycerine cloth and the circles should also be wiped over with a little glycerine. Some people go to the extent of using a little glycerine in the boil when flour is used; the amount is about 5 lb. glycerine to the cwt. of lemon curd, and it is added a few minutes before boiling is completed.

879. *Kindly give name of firm able to supply Irish moss.* (London.)

This was done.

880. *Please let us know of a British firm able to make glass-lined tanks of about 100 gallons capacity.* (London.)

Suggestions were made.

Canned Shrimps.

881. *There is another article which has now caught our interest, and that is canned shrimps. We understand that the packing of canned shrimps has gone on for a long time on the west coast of America, and that the packers there have arrived at a satisfactory result. We therefore beg to enquire whether you can give us some information about the American way of packing shrimps, especially what they are doing in order to avoid the blue or dark spots appearing on the contents after the tins have been sterilised?* (Norway.)

We will deal with this in the next issue. Parchment paper is used for lining the cans.

Mincemeat.

882. *Kindly give us some information on the preparation of mincemeat.* (Midlands.)

This is given on another page of the present issue.

883. *Please let us have a list of firms able to supply tomato oil.* (London.)

This was furnished.

884. *What are the physical and chemical properties of lecithin, pectin, gelatin, cornflour?* (Ireland.)

One would require a whole book to answer these questions. Assuming that you are interested in the commercial applications of these products, we cannot do better than refer you to the suppliers—unless, of course, you have any specific problem in mind.

Royal Appointment.

885. *How does a foodstuff come to be granted the honour of Royal appointment?* (England.)

We understand that the formal procedure is to write to the Comptroller of the Household asking permission to submit samples. A list is drawn up every year which is submitted to various Court authorities. If your name is retained on the list this gives you the privilege of using the words "By Royal Appointment." We are, however, open to correction.

886. *Kindly give method of preparing granulated rusks for putting into sausage, etc.* (Newcastle.)

The enquirer was referred to the maker of plant for this purpose.

887. *We should be obliged if you would kindly let us know the names of any firms supplying vacuum sealing machines suitable for closing glass jars, etc.* (London.)

Names were given.

888. *Will you please oblige us with the names and addresses of firms supplying foil capsules suitable for the tops of bottles for Christmas wines? Also firms who could supply labels?* (Newcastle.)

These were furnished.

Yeast Extract.

889. *We are writing you in connection with an article appearing in the February issue entitled "The Meat Taste," and in view of the special reference you make to the service rendered to enquiries from subscribers, we wish to avail ourselves of this privilege dealing with this particular article. We have completed the enquiry form desired, and would like to know if supplies of acid sodium glutamate are obtainable, and, if so, would you please forward our enquiry to the manufacturers, who could supply us with a small sample, at the same time advising the cost, and any literature on its properties and use?*

We are also interested in the mould Aspergillus Oryzæ, and would like to have the address of the firm from whom we could obtain this product.

We would appreciate any information you could give us on the manufacture of Yeast Extract, as this is a product in which we are closely interested. (Australia.)

Suppliers were given for the products named.

As regards yeast extract, the notes given on page 312 may be of some assistance.

Potato Crisps.

890. *Kindly inform us as to the process and plant required for making potato crisps.* (London.)

This depends on the size of the proposed output, the amount of capital expediture, and whether one is prepared to break away from the old style of things. In other words, is it to be a chip-shop affair or a "rationalised" installation of the automatic-continuous type?

891. *Can you inform us of a likely firm who will manufacture the paper bag as enclosed?* (Yorks.)

Suggestions made.

Pork Sausage.

892. *Kindly forward information on the manufacture of pork sausage.* (England.)

This enquiry is too general to be answered properly. As it stands a whole book would be needed. The following points should, however, be observed.

The pork should be as fresh as possible; it should also be unpickled and contain a moderate proportion of fat. All bones must be removed.

There are several types of binding materials, such as dried bread, rice, biscuit meal, rusks, etc.; the choice largely depends on the special palate of the district in which the sausage is to be sold.

Mace, pepper, and nutmeg are the seasonings generally used. Sometimes a little sage or thyme is added. Four hundred and fifty parts per million of SO_2 preservative is allowed.

The general method of manufacture is to chop up the meat and fat first in a special sausage chopping machine, and while this is being done the cereal, spices, and preservative are mixed into the meat and the whole well chopped and mixed.

The sausage is then filled by means of a stuffing machine into casings or runners, previously soaked and washed in

water. One pound lengths are weighed off and the sausages are kinked and twisted into the usual form.

893. *In your September issue we find an enquiry, No. 836, for a black currant strigging machine. We have for sale such a machine.*

Regarding No. 834 for a vegetable dicing machine. We shall be glad if you will put us in touch with the manufacturers of such a machine. (Ireland.)

This was done.

Glacé Cherries.

894. *With reference to the September issue, page 261, which contains an article on "Glacé Cherries," by John Elsbury, it is stated that "Boiling is carried on for about two to three hours." Surely "two to three hours" is an error, as the fruit would be so soft in that time as to become almost a pulp.* (Surrey.)

Mr. Elsbury informs us that two to three hours' gentle boiling is quite all right. He has known cherries in SO_2 to take four hours. He has never cooked sulphured cherries that would take the syrup in less than two hours.

895. *Can you give the names of United Kingdom manufacturers of coconut shredders, dryers, sifters, and toasters? The shredder and dryer is to have a capacity of 4,500 lb. of wet coconut per day. The coconut to be handled has a moisture content of about 47 per cent.* (London.)

Suggestions were made.

896. *Could you let me have names and addresses of dealers or merchants (not makers or sole agents of a particular maker) stocking special labour saving machines for the printing of box tops and the cutting and printing of labels for the cardboard box-making trade, etc.?* (London.)

Names were furnished.

Brining Olives.

897. *Can you tell us the correct strength of brine for bottled olives?* (London.)

We have an article on this subject for later publication.

Owing to their oil content, olives are pickled from four to six weeks before they are ripe. For brining and bottling green they are first treated with a strong solution of lye for twenty-four hours. They are then placed in fresh water, which is changed each twenty-four hours, until all traces of lye are washed out. After this they are ready for brining with a solution of 10 oz. of pure salt to each gallon of water. Care must be taken to prevent any bruising of the olives, and also to avoid contact with metal, otherwise darkening will result.

Re-brining and Re-packing.—The water used for preparing the brine should be boiled. The pure salt (10 oz. to each gallon of water) is well stirred in and allowed to stand for forty-eight hours in order to obtain a bright brine.

Jerusalem Artichokes.

898. *From the National Station of the B.B.C. the other evening, Mr. Gerald Heard, in the series of "This Surprising World," mentioned that a recent discovery regarding the extraordinary high sugar content (I think he mentioned lævulose) of Jerusalem artichokes threatened the already sorely pressed cane and beet sugar industries with further economic difficulties. I wonder if you would be kind enough to tell me how I could best secure all information, on the technical side, of this discovery. I gathered that it is the recently acquired chemical knowledge of this plant's peculiarities as a storer-up of a particular form of sugar in large proportions that comprises the sensational aspect. The method of extraction is what I would greatly appreciate your expert information upon, and advice as to how I might follow up the matter.* (Ireland.)

This subject of the commercial production of lævulose from Jerusalem artichokes was treated in two articles in *Industrial and Engineering Chemistry* in the November, 1931, issue and January, 1932, issue.

The authors of these papers are research workers in the Department of Chemistry of the Iowa State College, Ames, Iowa, and apparently they put up a semi-commercial plant capable of producing 50 lb. of lævulose per day, using Jerusalem artichokes as the raw material.

This was in operation during 1930, and a continuous-precipitation process was developed, yielding a very granular lime lævulate, which may be easily filtered and washed. The preparation of crystalline lævulose in good yields has been accomplished at ordinary temperatures (15° C.) without the use of refrigeration.

We have no later information than this, and would refer you to the original papers in *Industrial and Engineering Chemistry*, or probably better if you write direct to the Chemistry Department at the Iowa State College and ask them for the latest particulars and just what information you require.

899. *Have you any particulars of a cooling system in connection with the manufacture of jam?* (London.)

Some notes on this are given in the present issue.

Casings.

900. *I should be very thankful to you if you could give me some general indications on the standard specifications for sausage casings in England.*

What is the quality required for using the grade designation "first quality"?

What is the size referred to as "wide," and what is the size referred to as "medium"? (France.)

It is rather difficult to give you the various grades and descriptions of casings used. We take it that you are referring particularly to fresh sausage casings, such as pork and beef sausages.

Generally speaking, the "first quality" casing is that which has been entirely freed from fat. It is as white as possible and is free from defects, such as markings, discolorations, and is in long lengths.

The two kinds of casings are hog casings and sheep casings. Generally speaking, the hog casings are used for fresh sausage, although sheep casings are also used to a certain extent. All these casings are known as runners.

With regard to the size referred to as "wide," this is generally 1 to 1¼ inch in diameter, and is the size generally used for fresh sausage. "Medium" is round about ¾ to 1 inch in size, and is used for types of cooked sausage and also for a fresh sausage called Chippolata. Sausage casings are not graded so much in this country as they are in America.

901. *Kindly give us the names and addresses of makers of machinery for flaking, shredding, and puffing rice, wheat, etc., as supplied under enquiry No. 807.* (London.)

This was done.

Onion Blackening.

902. *What is the cause of the blackening of pickled onions?* (Wales.)

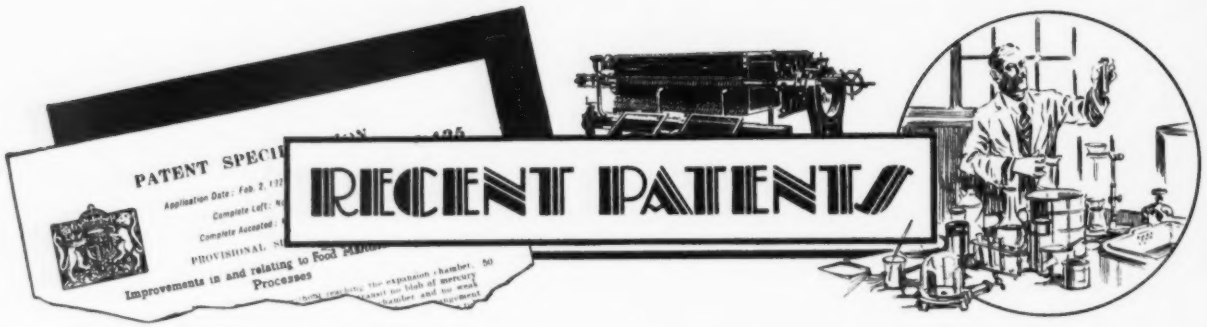
In 99 cases out of 100 it is due to contact with iron. You should be careful not to use iron funnels, jugs, pails, or any enamel ware, as enamel is liable to be chipped and so exposes the iron beneath. It is also stated that aluminium will cause blackening. Earthenware utensils for onions and red cabbage are the best.

Sometimes rust from the hoops gets on top of the cask; this must be washed off before opening the cask. Sometimes blackening may be caused by the cap of the bottle, sometimes by strong alkalis.

See that iron does not come in contact at any time with the brine, acid, vinegar, or the onions themselves.

903. *We shall be obliged if you can let us have the names of actual manufacturers of chocolate vermicelli, sometimes known in the baking trade as colorettes.* (Surrey.)

Suggestions were made.



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Latest Patent Applications

23787. AKT.-GES., FUR PATENT UND INDUSTRIE WERTE, and RAFN, W.: Preservation of milk, etc. Aug. 25.

23505. REWALD, B. A.: Production of egg-yolk substitutes. Aug. 22.

22967. SMITH, F. S.: Electrically sterilising food products, etc. Aug. 16.

Specifications Published

379,412. LINTON, F. A.: Cereal food preparations.

378,399. MAPSON, L. W., MACCURDY, J. T., NOLAN, H. O., and CAMBIO PRODUCTS, LTD.: Manufacture of concentrated edible products.

378,050. BEMIS, K. E.: Preparation of food products.

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

Abstracts Published

Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, either sheet by sheet as issued on payment of a subscription of 5s. per group volume, or in bound volumes price 2s. each.

372,738. **Bread-making; food preparations.** TRIGGS, W. W., 57, Lincoln's Inn Fields, London. (Naamlooze Vennootschap Handelscampagnie Alhaco, 80, Damrak, Amsterdam.)

A method of manufacturing baked articles from acidified dough, using yeast as a raising medium, comprises producing an acidifying medium by fermenting a mixture containing nutritive substances, such as wort, milk, flour from cereals or other sources, with leaven or leaven bacteria under conditions which favour the development of the bacteria, mixing the acidifying medium thus produced with dough which contains yeast and which may be partially fermented, loosening the acidified dough under conditions which favour the development of the yeast and then baking. Alternatively, the acid liquid may be used as the liquid for mixing with the flour and yeast to form the dough. The acidifying medium may be obtained in powder form for addition to the dough by mixing the acid liquid obtained by fermentation with flour, preferably flour rich in starch which is capable of absorbing a large amount of water, and then drying and grinding the mixture. Mixtures of nutritive substances specified are thin dough and a mixture of flour with milk which may be skim milk. Malted preparations containing diastase and/or yeast autolysate may be added to the nutritive liquid. The acid liquid produced during the acid fermentation may be partially neutralised by calcium carbonate, etc. To avoid undesirable subsidiary fermentations the fermentation with the leaven or leaven bacteria may be carried on for several hours at two different temperatures, first at about 32° to 35° C., at which temperature the undesirable bacteria are subdued, and then at about 24° to 28° C.

372,780. **Gelatine food products; confectionery, etc.** SWIFT AND CO., Union Stock Yards, Chicago, U.S.A. (Assignees of Zeigler, C.C. Maplewood, New Jersey, U.S.A.)

A gelatine food product for use in making desserts, as a confection, for preparing cake icings, etc., is obtained by dissolving in a small amount of water, flavouring matter, gelatine, and a substance such as invert sugar, or glycerine or diethylene glycol, with crystallisable sugar which will prevent the gelatine from returning from the gel to the dry form, adding a readily soluble ingredient, such as dehydrated gelatine or sucrose or other crystalline sugar in dry form, in an amount in excess of what readily dissolves in the solution, and suspending it therein by agitation and allowing the whole to gel with the particles of the ingredient mixed in the dry form with the gel. Fruit flavours are added to the product, and a fruit acid may also be included to bring out the flavour—*e.g.*, with orange or lemon flavouring—citric acid may be added, and with the flavours tartaric acid. The product may be poured into moulds or on a slab and stamped to the required shape, and the tablets, wafers, etc., obtained may be wrapped in transparent material. In one example, the product is packed together with a dry mixture of granulated sugar, granulated gelatine, and powdered fruit acid, which is added when dissolving the product in water to prepare a dessert.

CRAB CANNING (*Continued from page* 307)

the jar would be sterile if the process were stopped at this point. Fig. 2 represents the difference in time required to process the dry packed meat as compared to the time for that packed in brine. A temperature of 225° F. is reached in the wet packed product nearly five minutes quicker, indicating the necessity of a longer period for processing the dry meat. Such a curve is to be expected, since in the processing of all products the rate of heat transfer is dependent upon the ability of liquid to circulate through the medium and so govern the time required for the temperature of the product at the centre of the container to reach retort temperature.

The general conclusions reached were:

A method in which the crab meat is treated with an acid brine blanch for 5 minutes gives a package in which the colour of the meat is unchanged and the appearance attractive.

Heat-penetration curves show the relative rate of heat penetration of crab meat in different sized containers and the difference due to the method of packing.

(*To be continued.*)